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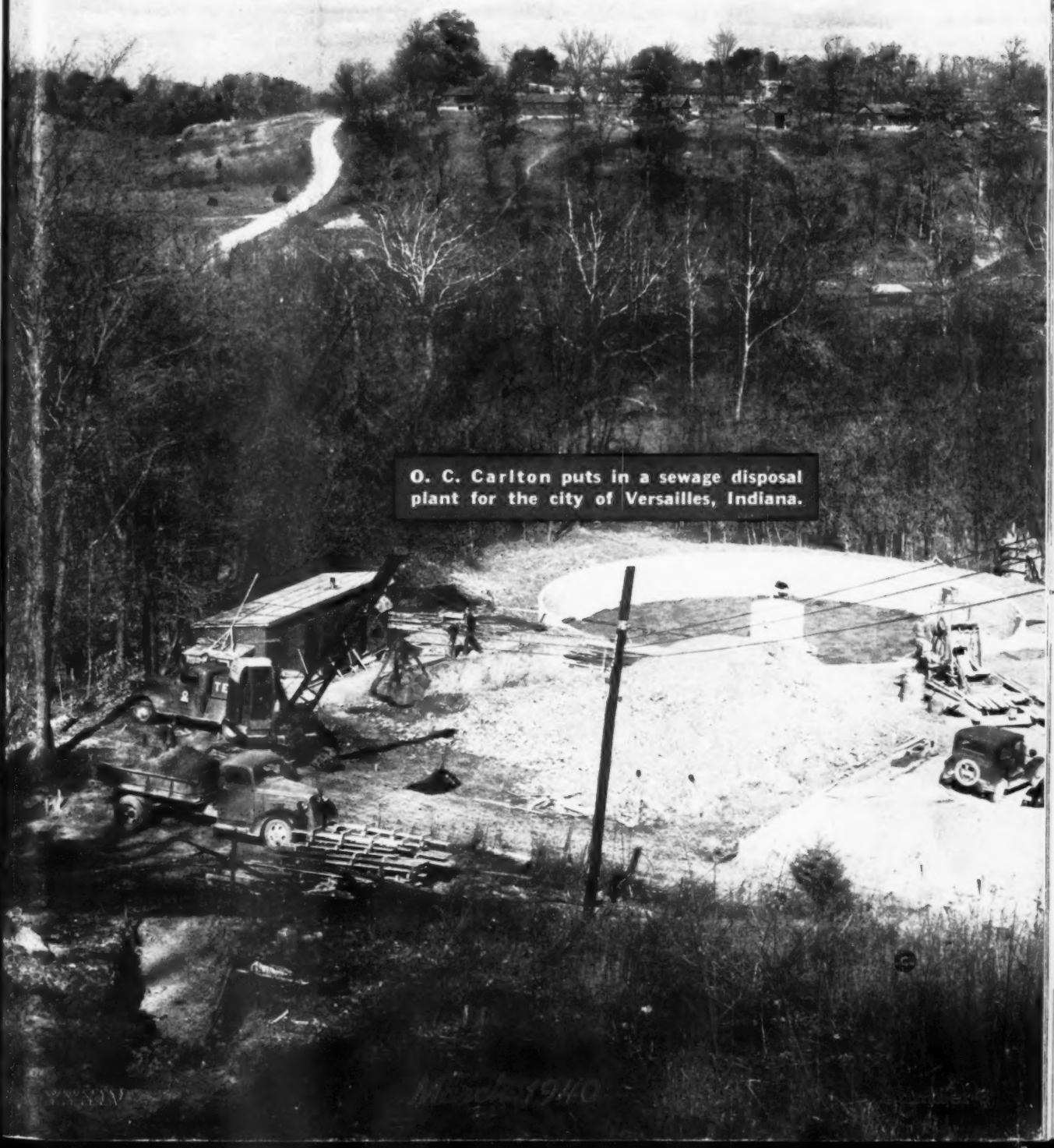
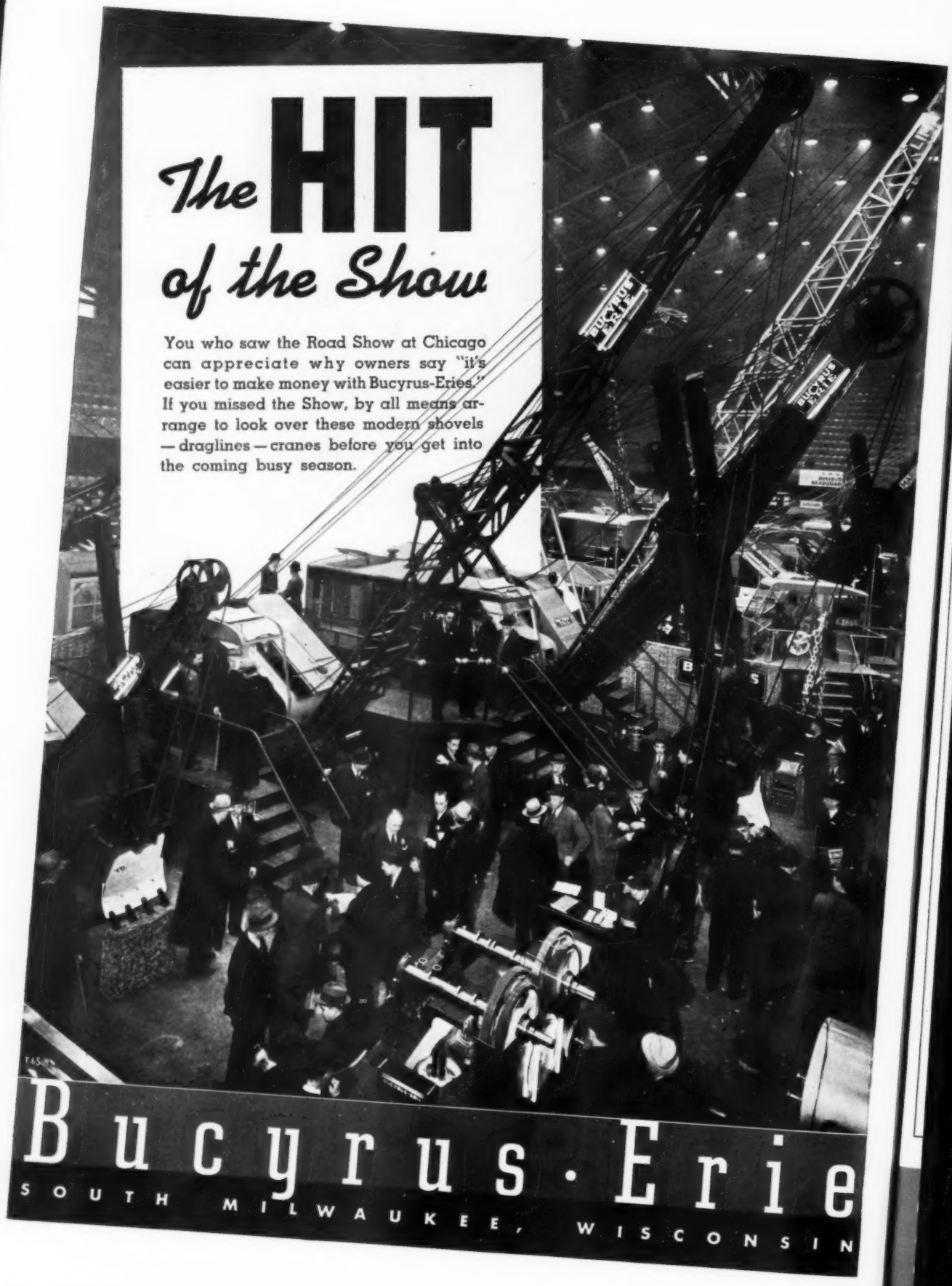


O. C. Carlton puts in a sewage disposal plant for the city of Versailles, Indiana.


The HIT of the Show
You who saw the Road Show at Chicago can appreciate why owners say "it's easier to make money with Bucyrus-Eries." If you missed the Show, by all means arrange to look over these modern shovels — draglines — cranes before you get into the coming busy season.
Bucyrus-Erie
SOUTH MILWAUKEE, WISCONSIN

EXCAVATING ENGINEER

FOUNDED 1905

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What does Reliable Power mean to YOU?

When a contractor's power plant fails . . . and there is no rock coming from the crusher, or no material from a hot mix plant, the overhead of idle men takes all the profit out of a job.

Contractors need power that will take care of the job from start to finish—power that is instantly available and can be depended upon without any pampering. They want a power plant that is compact and readily transportable to the next location.

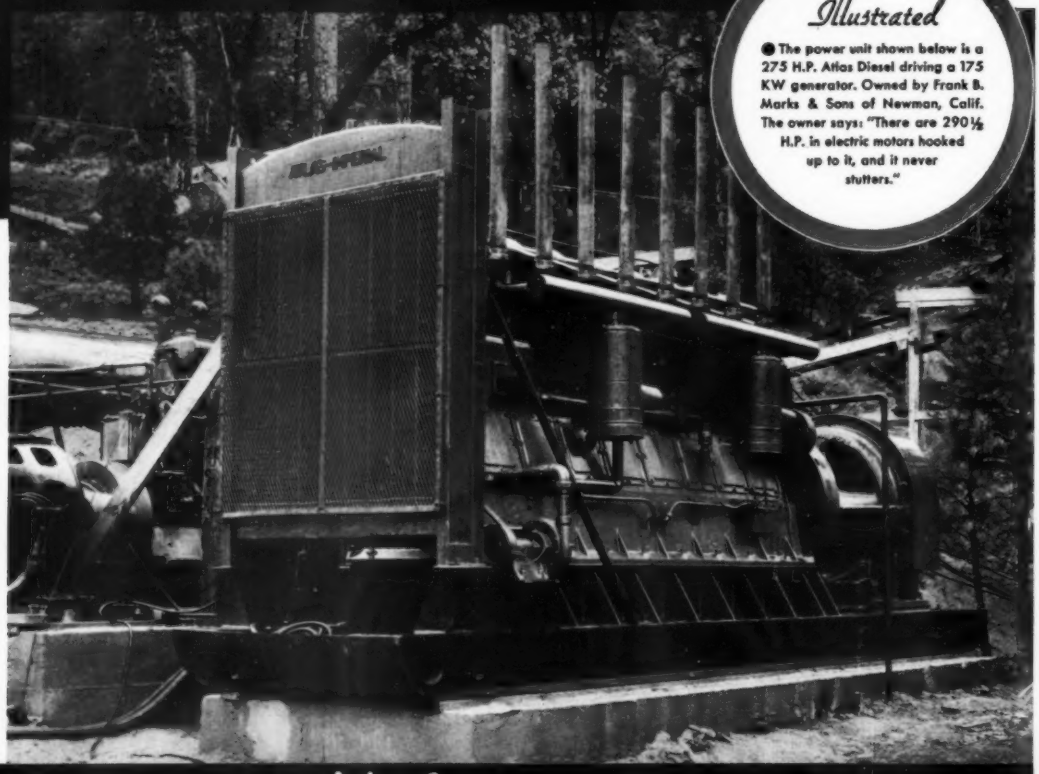
Atlas Diesels, such as the one pictured below, were proven in the construction industry more than ten years ago. They have earned enviable records all over the world for their stamina and dependability. Your choice of power may spell the difference between profit and loss on any job. Buy an Atlas Diesel and take no chances. Complete information sent on request . . . without obligation to you.

ATLAS IMPERIAL DIESEL ENGINE CO.

EASTERN DIVISION 115 BROAD STREET, NEW YORK, N. Y.
CENTRAL DIVISION 720 NORTH LA SALLE STREET, CHICAGO, ILLINOIS
SOUTHWESTERN DIVISION 3720 NAVIGATION BOULEVARD, HOUSTON, TEXAS
WESTERN DIVISION 1000 NINETEENTH AVENUE, OAKLAND, CALIFORNIA

Illustrated

● The power unit shown below is a 275 H.P. Atlas Diesel driving a 175 KW generator. Owned by Frank B. Marks & Sons of Newman, Calif. The owner says: "There are 290½ H.P. in electric motors hooked up to it, and it never stutters."



ATLAS Imperial DIESEL ENGINES

For your convenience in writing to Atlas Imperial Diesel Engine Co., you will find a card bound in this issue.

INCREASE *your* Dragline Output *with a* RED ARCH BUCKET

The extra pay load of every cycle gives you extra profits on every job. Get a Red Arch dragline bucket *(equipped with the new Red Arch chain)* and convince yourself that these buckets are better shaped to dig faster, are lighter to save more of your power for dirt-moving, are better balanced to carry higher heaps, are smoother flared and unobstructed to dump faster, and are strong and sturdy to stand up with less time-out. Try Red Arch. You save on maintenance and increase output — *that means more profit for you!*

Bucyrus·Erie

SOUTH MILWAUKEE, WISCONSIN

For your convenience in writing to Bucyrus-Erie Co., you will find a card bound in this issue.

● Above: General L. H. Callan, founder and president of the 26-year old Callan Construction Company. Below: Grading operations on the new extension of the Bulgarmarsh Road.

INTERSTATE

Building a Rhode Island sea wall with Massachusetts stone and making Massachusetts fills with Rhode Island earth solved an unusual excavation problem for the Callan Construction Company

By SPENCER JONES

IF YOU were driving through the Narragansett Bay section of eastern Rhode Island or that pond-studded portion of Massachusetts which adjoins it on the east, you'd probably pass truck after truck and shovel after shovel with the name, "Callan Construction Company, Inc."

Here in this maze of bays, islands, rivers and ponds . . . most of them with names that no one but a New Englander or an Indian can pronounce . . . the Callan Construction Company does considererably more than a little highway construction . . . and has been doing it for more than 25 years.

Looking for Callan Jobs

We drove through that country last summer to look at a couple of Callan highway jobs that were said to be going on near Tiverton, Rhode Island. Of course, we got lost on the way, so we asked the proprietor of a little roadside fried clam stand if there was a Callan Construction Company job near there . . . with a Mr. Dwyer in charge.

"You mean the outfit that builds all the roads around here?" he answered, Yankee fashion, and when we said we reckoned that was what we did mean, he continued, "Y'ain't fer frummit. Foller this road till y'come t' th' Stone Bridge at Tiverton, but don'tcha cross th' bridge 'cause that'll take y' t' Newport. You foller 'round t' y' left, t' th' south about 80 rods and you'll find some fellers fixin' a long stone wall and patching up a road that got washed out in th' tempest. Ask fer a feller named Jim Dwyer, he's the boss, but if he ain't there go down th' road a piece till y' come t' a sign says 'Boogamaash Road.' Y' turn left here 'cause y' can't turn right or y'd be in Nannaquaket Pond. Y' foller this here Boogamaash Road up over th' hill till y' come t' a place where there's a feller diggin' with a steam shovel. If Dwyer ain't there, y' keep right on till y' come t' th' Massachusetts State Line an' that's where Callan's buildin' a road. I gotta idear Dwyer's more'n likely t' be there."

So we followed directions; found the long stone wall being fixed and the road being patched, but no Mr. Dwyer; found "Boogamaash Road" (which turned out to be Bulgarmarsh Road); turned to the left (if we'd turned to the right we **would** have been in Nannaquaket Pond); followed Bulgarmarsh Road up over the hill and came to a place where a 33-B Bucyrus-Erie 1¼-yard gasoline shovel was busily loading out borrow earth onto 5-yard dump trucks.

Paul Dimasio, the operator, said, "No," Mr. Dwyer wasn't there, but if we'd follow one of those trucks we'd find him just over the State Line in Massachusetts.

● Above: Galion grader levels fill on the Massachusetts section of the interstate road job.

● Below: Bucyrus-Erie 1¼-yard loads out borrow in Rhode Island for road fill in Massachusetts.

ROAD JOB

"Is this Rhode Island, where you're digging?" we inquired.

"Yes," he replied, "but the fill is being made in Massachusetts. And did you notice that stone sea wall they're fixing just south of Tiverton? Well, that's in Rhode Island, but the stone's coming from Massachusetts."

Pondering the unusualness of this interstate traffic in earth and rock, we followed a loaded Sterling dump truck still further along the smoothly paved Bulgarmarsh Road until it reached the State Line and we dropped with a dull thud into Massachusetts.

Here, at last, we found Jim Dwyer superintending the construction of a mile of highway for the Commonwealth of Massachusetts from the Rhode Island line easterly toward the town of Westport . . . and also superintending, for the State of Rhode Island and Providence Plantations, the complete reconstruction of 982 feet of 2½-foot-thick stone sea wall placing 500 yards of stone riprap under the wall and making extensive repairs to about 1⅓ miles of bituminous macadam penetration and gravel pavement on Sakonnet Point Road in the towns of Tiverton and Little Compton, Rhode Island.

Is this a little confusing? Well, it was to us, too. But here's where we straighten it all out, we hope.

A Mile of Road for $55,000

On May 1, 1939, Callan Construction Company, Inc., Bristol, Rhode Island, was awarded a contract in the amount of $55,000 for the construction of one mile of 30-foot-wide hot top pavement with a gravel base, to be constructed for the Commonwealth (State) of Massachusetts in the town of Westport from the easterly end of the Bulgarmarsh Road at the Rhode Island State Line to a point approximately one mile east.

This mile of road crosses Bulgar Marsh (with plenty of marsh, but no Bulgars visible), a distance of about 1,000 feet, on an earth core dam . . . actually a deep fill, which is included in the contract. Since there were only about 11,000 yards of earth and rock excavation available from other parts of the new highway, it was necessary to obtain some borrow. The handiest point from which to get this borrow earth was about one mile west, in the State of Rhode Island. So that's why they were using Rhode Island earth for fill on a highway job in Massachusetts. We'll explain later how they happened to be hauling stone from Massachusetts to build a sea wall in Rhode Island.

The mile of road that Callan Construction Company was building is far more important to motorists than its length would indicate. This little section is the last link in a hard-surfaced cut-off route which eliminates 22 miles of the former driving distance between Newport and Cape Cod.

Considered as a job, without relation to its importance as a highway, it was not much of a specimen by which to judge the size and ability of the contracting firm. For Callan Construction Company, Inc., is a really big road-building concern. The $400,000 four-lane concrete highway, Massachusetts-U.S. 6, between Providence and Fall River; the $1,000,000 10-mile, curbed, four-lane concrete highway between Tiverton and Newport, and the founda-

● Above: William Cole (left), resident engineer for Rhode Island and Joseph Foley, general superintendent for the contractor. Below: A Galion "Chief" rolls the fill. Bulgar Marsh is in the background.

● Below: Riprap placement and reconstruction of this old sea wall in Rhode Island was part of the contract.

● Above: Looking east from Rhode Island into Massachusetts over an earth core dam across Bulgar Marsh.

tions and anchorages for the famous Mt. Hope Bridge between Bristol and Portsmouth are better examples of Callan capacity and skill.

By comparison with such jobs, the little one across the Bulgar Marsh didn't amount to much . . . but it was getting just as close attention as if it were a million-dollar contract.

Quantities and Prices

The quantities and prices involved included:

- 7,000 cu. yds. earth excavation at 50c cu. yd.
- 4,000 cu. yds. rock excavation at $1.50 cu. yd.
- 25,000 cu. yds. earth borrow at 35c cu. yd.
- 12,000 cu. yds. gravel borrow for pavement at 60c cu. yd.
- 2,500 cu. yds. 1½" to 2½" crushed stone for paving at $3.60 cu. yd.
- 1,500 lin. ft. reinforced concrete guard fencing with concrete posts and two 3" x 6" concrete rails at $1.10 lin. ft.
- 2,500 lin. ft. stock fencing, 4 ft. high, with wood posts and 6" sq. wire mesh at 25c lin. ft.

The contractor started work May 10, 1939, clearing away an exceptionally heavy growth of underbrush from the 80-foot right of way. Like most glaciated New England country, the ground was strewn with granite boulders in assorted sizes. These were drilled with Ingersoll-Rand jackhammers using 1½" removable bits, which were resharpened three times at the contractor's shops before discarding. An average of three feet of hole was made before resharpening was necessary, and speed of drilling was about three feet per hour. Compressed air at 100 lbs. pressure was furnished by a 210 c.f.m. gasoline-powered Ingersoll-Rand compressor. Blast holes were loaded with 1½"x8" sticks of du Pont 40% gelatine with a No. 6 blasting cap included, stemmed with sand and fired with a 50-hole blasting battery.

Stripping Muck from Roadway

While the boulders were being removed, a layer of muck about 18" deep was being stripped off the greater part of the length of the right-of-way and stored beside it. This stripping was done with a 1¼-yard, gasoline-powered 33-B Bucyrus-Erie shovel and a Le Tourneau bulldozer powered by a D-8 Caterpillar diesel tractor.

There were no important cuts on the job; most of it was fill, the earth for which came from the previously mentioned borrow pit where the 33-B loaded a fleet of 11 new 5-yard Sterling dump trucks plus a few 5-yard Macks, GMC's, Whites and Internationals at the rate of 1,400 yards per day, with a ½-mile haul each way for the trucks. The contractor paid three cents per yard for borrow earth.

An Allis-Chalmers model K tractor with a Baker bulldozer was used to spread fill, assisted by a gasoline-powered Galion grader which was later used for spreading the paving gravel, as well as the crushed stone. Rolling of fill and pavement was done with a Galion "Chief" roller and scarifier.

Included in the contract was a 70 foot reinforced concrete box culvert, 10 feet wide by 8 feet high, which passed through the earth core dam to allow the waters of Sawdy Pond to drain through to South Watuppa Pond. Both ponds are part of the Fall River water supply. The Bulgar Marsh, through which a small stream meandered, was the former outlet of Sawdy Pond.

Excavation in the muck and clay of Bulgar Marsh for the box culvert was done with a B-2 Erie steamer, rigged with a clamshell bucket. Plank coffer dams prevented the sides of the excavation from caving, and a six-inch Gorman-Rupp centrifugal pump kept the water level down. The main waters were kept out of each end of the culvert excavation by temporary earth dams.

Wood formwork was erected for the box culvert and the concrete was mixed in a model 27-E, 1-yard Foote paver. Ample earth cover was dumped over the completed culvert to allow for possible settlement of the fill.

About 2,500 feet of 12-inch, 18-inch, and 24-inch reinforced concrete drainpipe and 10 brick catchbasins were constructed by the contractor, as well as the fencing referred to previously.

The weather was fairly good during the entire progress of the job; the only major problem being where to find borrow earth . . . solved, as mentioned, by hauling it in from Rhode Island. Minor problems were avoidance of the numerous rattlesnakes and the plentiful poison ivy.

An average of 15 employees was used and wage rates and labor conditions were under both Federal and State control. The job, due for completion by August 15, 1939, was about 65% completed at the time it was visited, and was running on schedule time.

This mile of road in Massachusetts is the easterly end of some

● The 19-B digs up a 250-year old stone fence in Massachusetts for Rhode Island's sea wall. Watch out, Mr. Operator, the trailing vines are poison ivy!

five miles of road leading up to it in Rhode Island, all of it built by Callan Construction Company a section at a time during the past four years. This company built the Sakonnet Point Road from Tiverton south past the Bulgarmarsh Road and also built all improved sections of the Bulgarmarsh Road up to the State Line.

Highway Department Officials

The new road in Massachusetts was built for the Massachusetts Highway Department of the Department of Public Works, of which Wm. H. Callahan was commissioner and Coffin Field engineer-in-charge. James Dwyer was superintendent for the contractor.

Now . . . to straighten out the other mystery and explain why it was necessary to go to Massachusetts to get stones to build the sea wall in Rhode Island . . . here are the facts.

Back in 1933 the Division of Roads and Bridges of the Department of Public Works of the State of Rhode Island and Providence Plantations (that's the official name) let a contract to the Callan Construction Company for the construction of 2.43 miles of bituminous macadam highway from Tiverton south to the Sakonnet Point Road. The contract also included the building of a causeway across the northern end of Nannaquaket Pond and the removal and re-building of a long stone wall acting as a combination sea wall and guard rail and considerable riprap at the base of this wall along the northeastern shore of the Sakonnet River, a wide inlet of Narragansett Bay. The highway was then known as the Old Main Road, but is now in effect a part of the Sakonnet Point Road.

Callan Construction Company completed this contract in September of 1934 and did a good job, but that "tempest" to which the fried clam stand proprietor referred was the terrific hurricane of September, 1938, and the wall just wasn't designed or built to withstand 20-foot waves . . . so it was simply washed away for a good part of its length, as was also the road behind it.

Hence, there was another job of roadbuilding and stone sea wall building to be done and Callan Construction Company was awarded the job on its bid of about $19,800. The length of the damaged road was 1.35 miles and the washouts were from five feet to 24 feet deep into the pavement. Major quantities and prices involved were:

2,559	cu. yds. earth excavation at 30c per cu. yd.
348	cu. yds. trench excavation up to 5 ft. deep at 80c per cu. yd.
844	cu. yds. borrow at 30c per cu. yd.
844	cu. yds. haulage on borrow for maximum distance of 15,000 ft. at 30c per cu. yd.
Wall	foundation, rock fill at $750.00 lump sum.
391	cu. yds. stone masonry at $9.00 cu. yd.
108	cu. yds. stone masonry, dry random rubble, $6.00 cu. yd.

A ⅝-yard, gas-powered, 19-B Bucyrus-Erie shovel, operated by William Gladu, handled the earth excavation and was then transformed into a drag shovel and dug the trench for the fence foundation. Earth for the fill, in addition to that excavated on the job, came from the borrow pit previously described . . . out on the "Boogamaash" Road . . . and was loaded out by the 33-B and hauled with some of the previously-described 5-yard dump trucks.

Stone Fence Used for Sea Wall

Strange as it may seem to those who are familiar with New England, there wasn't enough stone near the job in Rhode Island to re-build the sea wall, its foundation and the riprap. This is one of the few recorded instances where there has been a failure in the Rhode Island rock crop.

● James Dwyer, superintendent of construction. The GMC helps him be every place at the same time — a feat required of every good construction superintendent.

But in examining the site of the new road he was about to build in Massachusetts, the contractor discovered that he had to remove a couple of thousand feet of good old-fashioned stone fence. What was more natural than that he should change the front end of the 19-B dragshovel and send it into Massachusetts to load those fence stones into trucks and haul them into Rhode Island?

And that's how the removal of a stone fence became interstate traffic. Luckily Rhode Island and Massachusetts don't maintain ports of entry like some of our western states, or the job might have been full of legal complications.

The actual work of re-building the road and the wall and riprap was also free of complications . . . hardly any, if as good, an example of Callan Construction Company ability as the Massachusetts mile. But we had reached that section between jobs, you might say, and had the bad luck to miss seeing the Callan organization in real action.

But we did have one big piece

(*Continued on page 178*)

DIESEL TIPS

A Research Technician gives the Ten Commandments of diesel usage along with an interesting discussion on making your diesel engine pay dividends in efficiency and economy.

By W. K. BOWMAN
Research Technician

ON AN EXCAVATION project in Southern California employing a large number of diesel powered shovels, tractors, and trucks, where a careful check was kept on each unit of equipment, the records showed a lost time average that in three months had increased from 20 minutes per day to nearly 40 for each unit. Considering all the factors that enter into lost time, 20 minutes is good, but when this is doubled the effect on production may mean the difference between profit and loss on a contract.

In this case the contractor maintained a well-equipped field shop, a regular daily servicing program was being followed carefully, the best of fuels, oils, and repair supplies were being used, and the contractor didn't understand why his equipment should be playing him such tricks.

Suspecting the operators, he required them to attend short classes in diesel operation, and tightened up on the enforcement of rules for operators. It only helped a little.

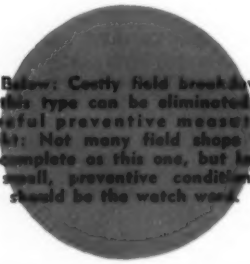
Preventive Maintenance the Solution

In the meantime he had been doing some pretty careful investigating, and as a result he replaced his head mechanic. Lost time decreased almost at once. The whole trouble had been poor preventive maintenance. The discharged foreman knew how to make repairs, but he neglected replacements that should have been made before they caused trouble. A leak around a water pump packing permitted water to get into a bearing and wear it out; a bearing that should have been tightened burned out and damaged the mountings. These and similar cases of neglect had resulted in break-downs that never should have occurred.

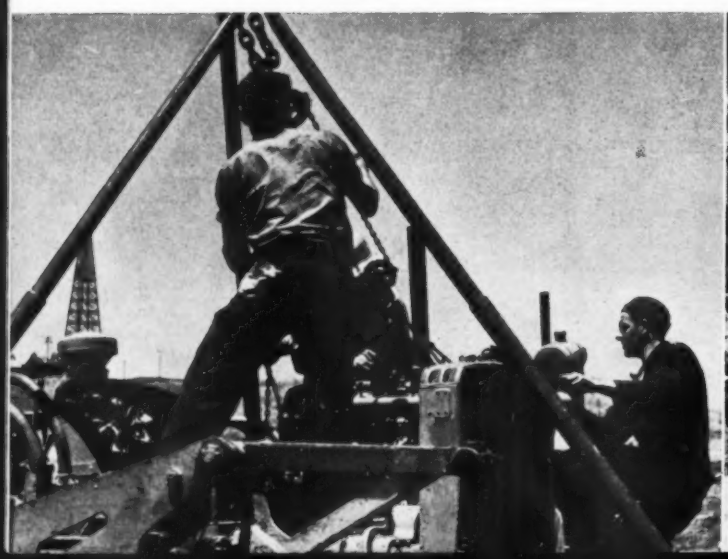
Manufacturers are constantly improving the mechanical perfection and ruggedness of their equipment but this does not absolve the user from maintaining a system of careful conditioning of his equipment. Especially is this true of diesels, and whether it is the responsibility of a maintenance department or of an individual owner-operator, a careful and methodical checking and conditioning program with the object

TEN COMMANDMENTS
(For Diesel Operators)

1. Thou shalt keep thine engine clean and in adjustment that thy life in its company shall be long, and that the owner shall increase thy pay.
2. Know thine engine and all its parts and functions, else thou shalt be stalled in some unholy spot.
3. Be not wise in thine own conceit. Remember the factory instructions and keep them holy, lest repairs be thine undoing.
4. Be not loose in thy jaw hinges, for no man knoweth all about diesels. The truly wise absorbeth much knowledge and exudeth little, and he who so doeth shall gain repute among his fellows and the favors of his superiors.
5. For all things in this life that thou desireth thou shalt also pay—plenty—and for the wisdom of experience, no less. Advice from the multitude costeth nothing and is usually worth just that.
6. In the books thou mayest read what to do and when, but only the voice of experience may tell why and how, else thy reading of what and when shall but plague thee with smoke.
7. God maketh the earth to rotate endlessly without bearings or oil, but not thy diesel.
8. Curse not thine engine when it turneth not; curse rather thine own stupidity.
9. Steam engines and gas may long turn over though sloppy; a diesel not so. With gauges and with mikes be thou ever busy.
10. The Eternal Eye watchest universal operations, but thou shalt not rely on it as to thy diesel. Thine own vigilance is the price thou payest for thy job.



● Below: Costly field breakdowns of this type can be eliminated by careful preventive measures. Right: Not many field shops are as complete as this one, but large or small, preventive conditioning should be the watch word.



From A Trouble Shooter

of prevention rather than repairs, should be carried out.

On the other hand, a poor operator can make the services of the best mechanic in the world futile, and this is a far more frequent cause of poor performance than the other way around.

It is the owner's own fault if he abuses his own equipment, and it is likewise his if he lets somebody else do it. It is just as important to check on operators and weed out the poor ones as it is to check equipment.

The most common forms of abuse are neglect of servicing and checking, such as waiting until the engine is overheated before filling the radiator, letting the oil get low before refilling or adding, permitting the fuel supply to run out, clashing gears in careless shifting operation, rough or jerky handling, racing a cold engine at high speed, running too fast over rough ground. Overloading is one of the most common, and unfortunately one of the most harmful forms of abuse. If done before the engine is warmed up it means not only a terrific strain on engine parts, but a strain without proper lubrication. The usual reason for overloading is haste. Naturally you go faster in a higher gear, but a lower gear and a little less speed will mean a saving of time and trouble in the end.

Overlooking "little things" is all too common, and the realization that much of the serious trouble can be traced directly to them all too rare.

Dust, Diesel Enemy No. 1

Dust is Diesel Enemy No. one chiefly because of such neglect. There's always plenty of it around waiting for an opportunity to get into your engine and start grinding on rings and cylinder walls. All dust needs is an air cleaner that's a bit too dry or a leaky gasket on the intake manifold. Because its work is gradual and inside the engine dust seepage may go on for a long time without being noticed. It may be unsuspected until an overhaul reveals its effect, and even then it may not be easy to find how the dust got in.

One maintenance department had to call in outside help to locate the trouble on a diesel tractor. They knew from the telltale undue wear on the top ring that dust was entering, but the cleaner was OK and everything was tight on the air induction system. A partially clogged pipe leading from the cleaner to the engine, together with a minute crack in the intake manifold too small to allow dust to enter under ordinary conditions, was finally found guilty.

Another similar instance was a partly clogged air cleaner inlet tube which caused such an increase in the velocity of the inducted air that it pulled the dust right past the oil in the bottom of the cleaner and on into the engine. Coupled with this, the bowl of the cleaner was only being cleaned every 60 hours, which would have been often enough under dustless conditions, but here the dust was so bad that the men had to wear handkerchiefs over their mouths. Under the circumstances the bowl should have been cleaned at least every 8 hours or even oftener. Operating conditions must always be taken into account in any servicing program.

Diesel Lubricant Qualities

Everybody realizes the importance of correct lubrication, but the best medium for obtaining it is still a controversial question even among technicians. The general result desired from a diesel lubricant is a heat resisting and absorbing agent that will also absorb and remove unburned fuel residues that cause carbon and gum formation. In other words, it should lubricate, cool and clean.

The controversy arises over the

● Silhouetted against the setting sun, a diesel-powered dragline works into the night. Big jobs call for these continuous operations and careful maintenance and conditioning make this performance possible.

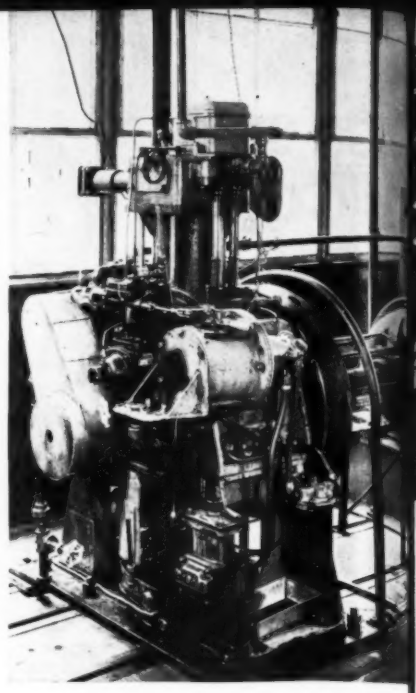
relative merits of naphthenic and paraffin base oils. There is little question of the superiority of the latter for gasoline motors. Gasoline leaves no residues such as produced by diesel fuels, so that their removal is not a problem. Paraffin base oil is more resistant to viscosity changes and oxidation. The advocates of naphthenic base oils, however, assert that for diesels, because of the similarity of such oil to diesel fuel, which is usually a distillate, there is a greater affinity between the two, with consequent superior absorbtion of asphaltic residues left by unburned fuel. Besides this ability to wash away combustion residues, naphthenic oils do not deposit the hard carbon characteristic of paraffin oils.

However this may be, there is one thing you may be sure of, and that is that any inferior quality oil of either base will produce an excessive quantity of undesirable materials and fail to give satisfactory results.

Inferior oils often contain excessive amounts of sulphur and water as well as undesirable sediments. Sulphur in combination with water causes corrosion of engine parts, water accelerates sludging, and all sediments cause ring sticking and abrasion. Water, of course, is a product of combustion, a gallon of fuel in either a gasoline or diesel engine producing more than a gallon of water, which normally goes out of the exhaust. Under some conditions, such as in a cold engine, a certain amount of moisture will condense from the blow-by gas passing through the crankcase, mixing with the oil. The periodic oil change is important for this reason, as well as for others.

Clay type filters or chemically treated cotton pack filters remove or destroy certain portions of compounded oils, and should not be used with them. On the other hand, compounded oils should not be used in engines with alloy bearings, unless especially designed for such use, because of the possibility of corrosion at high temperatures.

It is important to follow factory instructions for oil changes. Filters do not, as many believe, take care of the renewal of oil. They merely strain foreign particles from it. This is an invaluable function, and because it is, the specified filter replacement should be carefully observed.



● The engine manufacturer uses machines of this type to test his product. Any field condition may be duplicated on this machine, which differs from standard production units in its quick-detachable cylinder head and cylinders.

Self-Ignition Quality Important

An understanding of the whys and wherefores of diesel fuels is a good thing to have. In one important respect, ignition quality, the characteristics that make a good automobile motor fuel make a poor diesel fuel, and since it is this quality that is the chief concern in determining a good or bad fuel, it is worth studying.

A diesel engine requires fuel with a low self-ignition temperature. It should ignite when first injected into the engine to supply the flame which fires the main body of fuel. For this reason, straight run distillates are the best diesel fuel because of their high octane number. The mark of a good fuel is smoothness, and oppositely, the mark of a poor one is rough running from rapid pressure rises, and pounding or knock, all caused by improper ignition.

Any combustion knock is harmful. It is not just a noise, but a definite force. Briefly explained, there are three causes of a diesel knock: too early injection of fuel; uneven setting of injection valves or tappets; and a plugged up nozzle. All of these result in sufficient fuel being present to cause a heavy explosion when ignition occurs. The difference between this and correct combustion may be compared to the difference between a steady push and a sudden blow. It damages parts and means a loss of power and efficiency. Power is generated too rapidly for the engine to absorb it, and the excess is wasted.

The effect of altitude is sometimes not taken into account, but it can be a serious factor in engine

(Continued on page 180)

● Dust is diesel enemy number one. Precautions against it are rewarded in efficient and economical operation.

Reclaiming the Good Earth

The fertile fields of California's Imperial Valley are the realization of a dream nearly a century old

By FLOYD SUTER BIXBY

ANGELO MOPPED his sweating face with a dirty rag. Through the long hot day Angelo had toiled in the field and now, as the long evening shades crept down, he wearily put away his watering pot and his hoe. Always, at the end of day, Angelo was thankful for this brief lull at the toolhouse. There, while he waited for his son who watered the upper field to join him, Angelo could pause and remember.

As his tired Mexican eyes turned toward the ragged mountains on the horizon miles away, Angelo lived again a day of thirty years gone by. He lived in retrospect a day when this field was part of the blistering, barren desert, and the precious lifestream of water had not reached its broad acres. In his simple mind, Angelo was thankful indeed for this miracle of water coming to the desert. He crossed himself piously. And all the golden brilliance of the sun was caught for a moment in the bare, purple teeth of the western California mountain range as another day was nipped off old Angelo's lifetime, and night dropped swiftly.

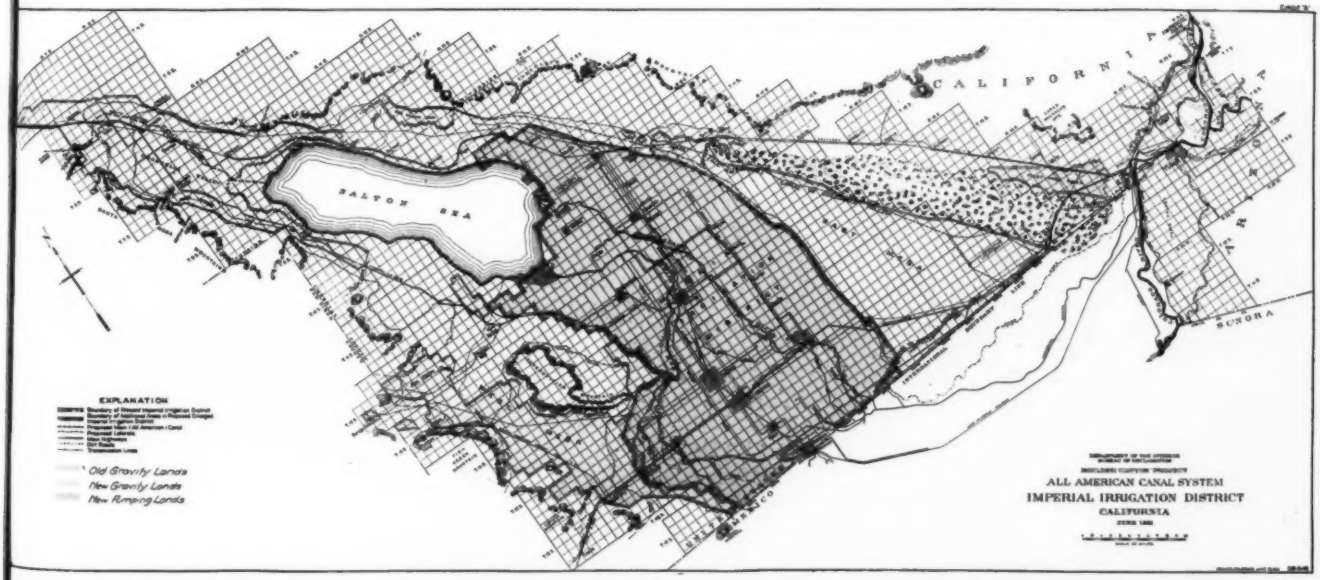
A Half Million-Acre Garden

Beyond Angelo's tomato field, within a valley bounded on either side by towering mountains, is the largest irrigation project in the western hemisphere, enormous beyond Angelo's comprehension. In this valley lies 645,000 acres of land, and more than a half million acres of it is a verdant garden, crossed at regular intervals by canals and irrigation ditches. Through these ditches and broad canals flow the lifestream of water from the mighty Colorado River, miles and miles away. That, in a paragraph, is the Imperial Irrigation District of Imperial, California.

The history of the District is a story of dogged determination that succeeded. It is a story of hardship and financial reverses; of warm friendships and bitter enmities. It is a story gouged in the sands of a sun-baked desert by hardy, brave men and women. It covers the growth of the Machine Age from the days of slips and sweating mules to the last word in modern draglines.

But withal, the development of the Imperial Valley of Southern California is a plain American story of pioneering achievement. The need for the development of

● **Bureau of Reclamation map of the Imperial Irrigation District, showing its relation to the All-American canal.**



● A section of the All-American canal being "tempered" with a slight flow of water.

Imperial Valley was as urgent as it was simple. With the growth of the Los Angeles metropolitan area and the development of San Diego and smaller southern California cities nearby arose the need of a gardening area to raise the vegetables and fruits needed to feed an ever increasing population. It is as easy to answer as that.

An Idea is Born

Probably the first man to earnestly conceive the idea of routing water to Imperial Valley from the Colorado River was a young doctor, who settled in San Francisco in 1849. The name of this man, Dr. Oliver Meredith Wozencraft, will be remembered so long as men record the annals of Imperial Valley. In that early day, Dr. Wozencraft spent all his available time for weeks on end in the desert, working, surveying, and laying plans for the ultimate reclamation of the desert wasteland.

About the time of the Civil War, Dr. Wozencraft enlisted the aid of Ebenezer Hadley, county surveyor of San Diego County, in a promotional scheme for the development and colonization of the valley. His scheme was to be financed by the sale of some 3,000,000 acres of Government land which he proposed be given to the state of California by the United States. The proposal failed to pass a Congress packed with eastern opponents unimpressed by the idea of reclaiming a desert which they heard was dry, unbearably hot, and unfit for human habitation. Dr. Wozencraft never lived to see the realization of his dreams. He died an old man, his personal funds exhausted from vain trips to Washington; his only crime that of being guilty of living fifty years ahead of his time.

In 1876, the Corps of Engineers of the United States Army made a topographical survey, studying the feasibility of the construction of a canal entirely within the United States from the Colorado River to the Imperial Valley desert, but it reported unfavorably on the proposal. The Army recommendation called attention, as had Dr. Wozencraft's surveys, to the feasibility of a canal following natural drainage lines through northern Mexico and back into California through Imperial Valley, draining northward into Salton Sink, low spot of an ancient sea, in northern Imperial County, California.

For several years, little else was done. And then, down through the "Roaring Eighties," stepped another of the men destined to pick up the reins where Dr. Wozencraft laid them down — Charles Robinson Rockwood, a brilliant, hard-fighting engineer for whom Rockwood Heading is now named.

● Above: Superintendent Van Leer talks things over with shovel-runner England while the 17-B is greased. Left: Throwing dirt with a ¼-yard Owens bucket, this Bucyrus-Erie cleans out a drainage ditch west of El Centro.

In 1892 Rockwood surveyed the Mexico route for a canal and organized the Colorado River Irrigation Company, which promptly failed for lack of finances.

In 1896 the California Development Company, predecessor of the Imperial Irrigation District, was organized. More financial reverses, augmented by the adverse effect of the Spanish-American War on eastern capital, made the task unsurmountable to any except a man of Rockwood's caliber. With far seeing faith, he and his associates stuck behind their guns, sometimes hungry but never despairing, and in June, 1901, the first trickle of water flowed into the valley. By the next year about 2,000 people had made their homes near the canal.

Formation of District

Out of that 2,000 persons arose a population in the valley which led, on July 25, 1911, to the organization of the present Imperial Irrigation District, a co-operative organization organized in accordance with the California state irrigation laws.

Construction of the first canal was followed by a number of problems, some of which carry on down to the present time. Most ironic, and serious at the time, was floodwater from the Colorado which swept down the river, tearing out diversion gates, levees and protective works. When the Colorado tore out these structures it was impossible to again divert the flow into the irrigation canal until valley crops under irrigation had suffered untold damage. Thus was born the need of a storage and flood control dam in the upper reaches of the Colorado; a need which today is realized in the construction of Boulder Dam.

The Imperial Valley comprises the larger portion of the northern slope of the delta built by the Colorado River as it has cut across the Gulf of California and separated Salton Sink from the sea. The soils of the valley are made up chiefly of silts and sands brought into the valley from six states of the drainage area of the river basin. As a rule, the soils are classed as hard, medium, or soft, depending on their friability under cultivation.

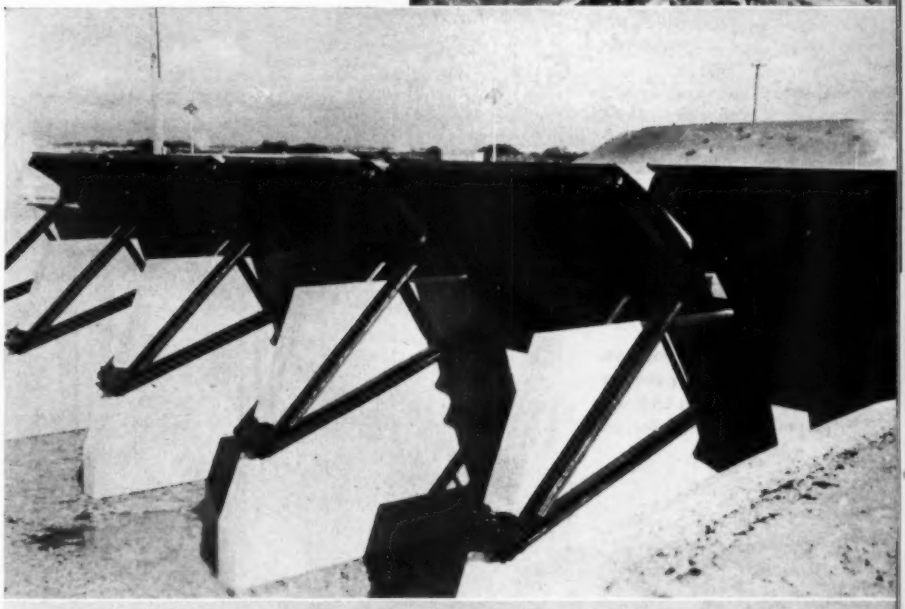
● Swinging a ⅝-yard Esco bucket, this Bucyrus-Erie dragline cuts a 6-foot ditch for installation of concrete drainage pipe.

Surface Drainage Necessary

This soils are of great depth and free from hardpan. In the early days it was thought that surface drainage would not be necessary, but this assumption proved to be erroneous. The District finds drainage necessary for practically

(*Continued on page 174*)

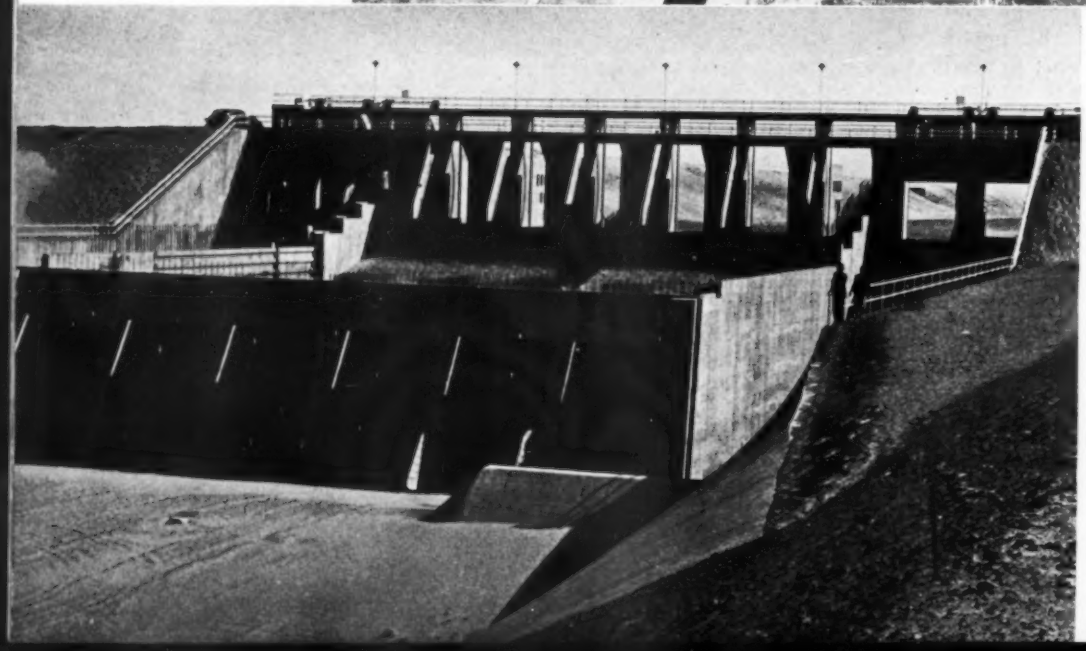
Picture Story of All-American Canal on Pages 156 to 159



● Above: Electrically-powered steel gates across the All-American canal, which will be used to divert water into the district's intake. Right: These 18-foot pipes carry the All-American across the New river, near Calexico.

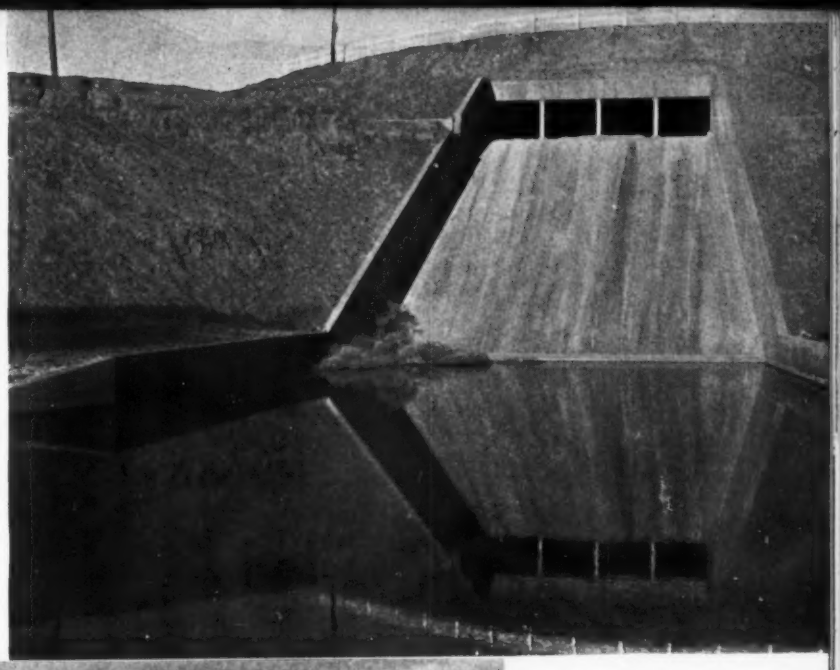
● Water, on its way to the thirsty Imperial Valley, foams through the partially opened gates of the Imperial Dam.

● Air view of Imperial Dam. At the left are the desilting works which will clean the water for its journey.



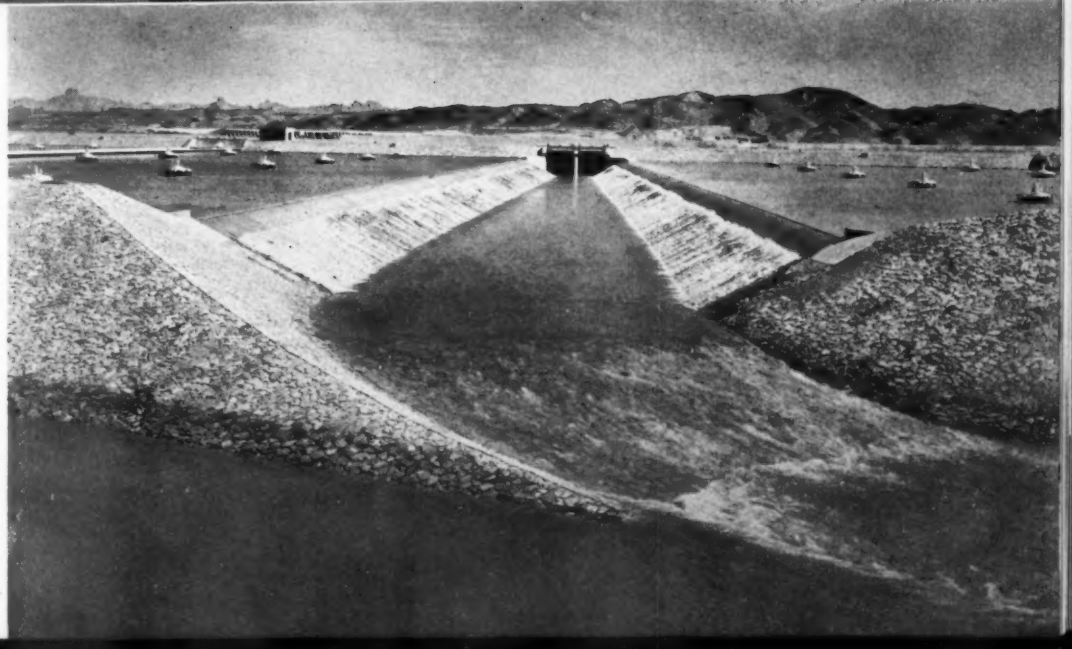
● Gates controlling flow of All-American Canal at power drop No. 4. From here the water is bound for the desilting chambers.

IMPERIAL Irrigation District's canals and ditches are dependant upon the water that the southern branch of the All-American Canal carries across the desert to the Imperial Valley. Over 60,000,000 yards of earth were moved in the construction of this gigantic irrigation system. Heat, blowing sand, and floods were some of the difficult problems overcome by the contractors who brought the waters of the Colorado River to the desert.

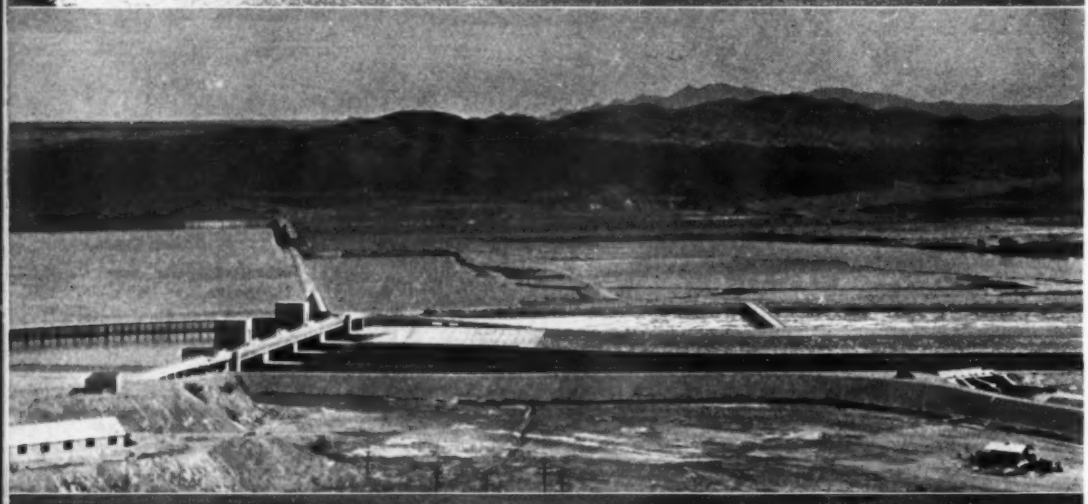


● Above: Pipe line spillway for dumping water directly into New River. Left: Turbulent dam water is tamed in these four channels.

● Desilting chambers at Imperial Dam in full operation. Dam and gates at upper left.



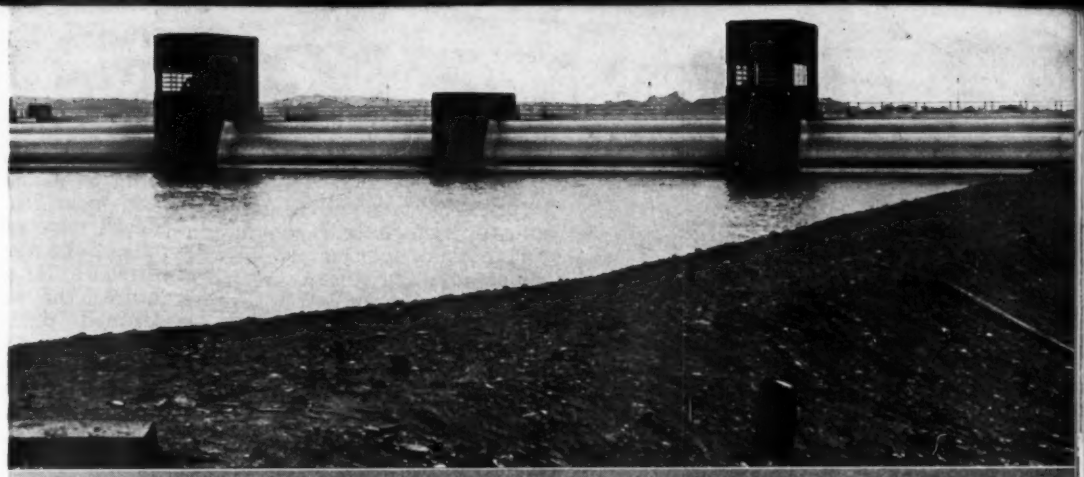
● One of the few cuts through rock formation was made at Pilot Knob to avoid entering Mexican territory.



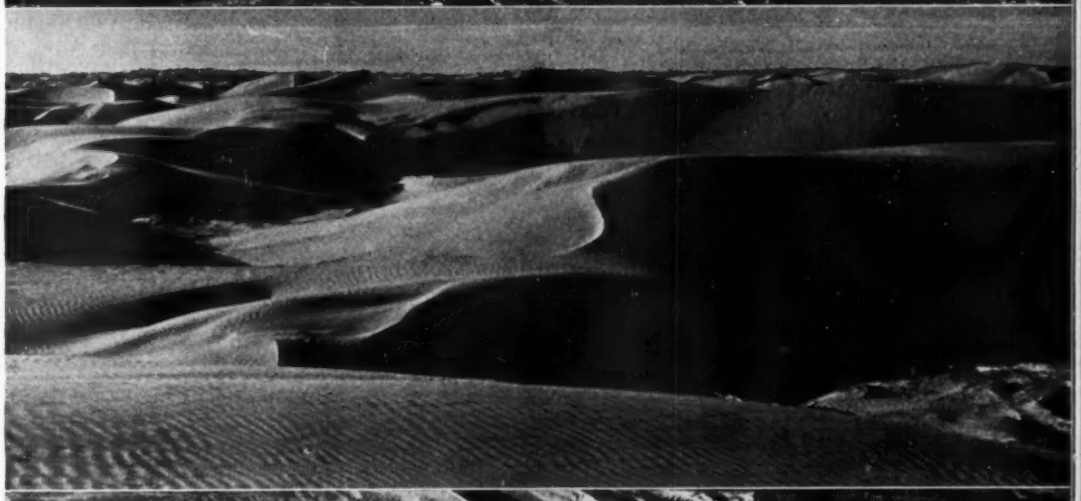
● General view of Imperial Dam across the Colorado River. Entrance gates are at the left.

● Detail of the All-American Canal desilting works, shown partially empty.

● Side view of the 18-foot twin pipes that carry the All-American Canal over the New River.



● Colorado River water is controlled by these Imperial Dam gates. They are electrically operated by engineers stationed in the towers.



● These rolling sand dunes give some idea of the problems that were overcome by All-American Canal contractors.

● Air view of section of All - American, partly filled with test water. Rain water aqueduct at right.

● Detail of a rain water aqueduct. These structures act as "water bridges" protecting canal banks from sudden floods.

EXCAVATING ENGINEER

A Monthly Publication
Devoted to the Excavating Industry

The Excavating Engineer Publishing Co.
South Milwaukee, Wisconsin

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Diversion

Integrity of highway funds derived from special motor vehicle taxes is seriously threatened by the diversion method in attempts to arrive at a "paper balance of the budget." So-called bookkeeping transactions of this type may appear to be the easiest way out in the face of coming state elections.

Diversions in New York seem destined, at this writing, to continue somewhere between $63,000,000 and $68,000,000—a little lower than 1939, but much higher than 1938. The highway users of New Jersey, South Carolina, Washington and Wisconsin are confronted with possible raids on highway funds to meet fiscal crises.

Efforts are reported in California to circumvent the anti-diversion amendment recently adopted in that state. Means will be sought to open the door for large scale borrowing of highway revenues for general fund purposes. The Governor may also advocate reorganization of State Departments or a state manager plan which will include lumping all tax receipts into one fund.

The motoring public has found by sad experience that anti-diversion constitutional amendments offer the best protection against the misapplication of highway funds. Necessary legislative steps looking toward the adoption of such amendments are being urged in Louisiana, Kentucky, Mississippi, Rhode Island and Virginia. The electorates of Idaho, Nevada, and South Dakota will vote on such amendments at the November election. Initiated petitions may place proposed amendments before the voters in Ohio and Nebraska.

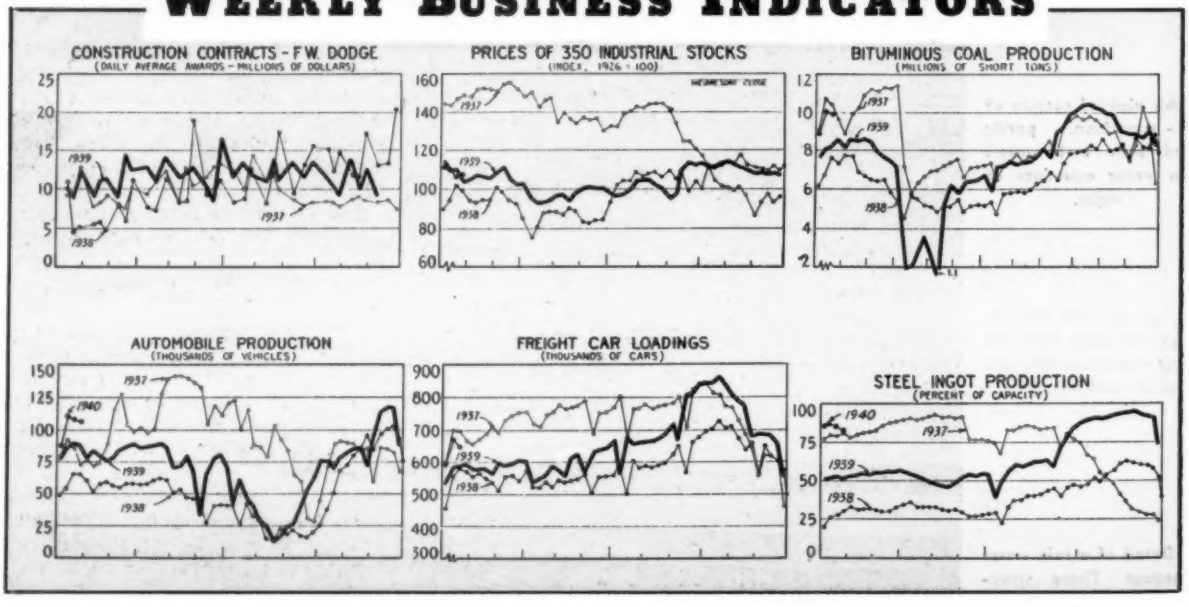
The problem of local sharing in gasoline and motor vehicle tax revenues, always a vexatious one, will come before the legislatures of Kentucky, Rhode Island, South Carolina, Virginia, and Washington. The Pennsylvania solons may have before them a demand from the City of Philadelphia for an additional share of these revenues (supported by the Keystone Automobile Club). This demand may be eased somewhat in view of the City Administration having effected some economies and by the recent enactment of a 1½% payroll tax covering all gainfully employed in the city.

Fight Cancer

Cancer is a curious foe. Second only to heart trouble as a killer and most feared of all causes of death, cancer is in its early stages one of the most curable of serious diseases. Its definite diagnosis requires the services of a highly trained pathologist, but early symptoms which may mean the disease is present are easily recognized by any alert individual. Once cancer is diagnosed the preferred treatment is by a group of specialists and yet the key man in the whole picture of cancer control is the general practitioner to whom patients come for periodic examinations or for advice about apparently harmless conditions. While late cancer causes considerable suffering, in the early stages it is nearly always painless.

It is fitting that this paradoxical disease should be fought by an army, not chiefly of men but of women, an army not of destruction but of education, and its war should be a war to save life. Four years ago a small group of physicians, research workers, and club women launched the Women's Field Army of the American Society for the Control of Cancer. Its goal was to reduce cancer mortality and to arouse the interest of men and women everywhere in this disease and the methods and facilities available in their communities for treating and controlling it. Between one-third and one-half of those who now die could and should be saved by early

WEEKLY BUSINESS INDICATORS



● This picture-chart, compiled by Engineering News-Record, graphically portrays the comparison between 1939 state highway accomplishments and 1940 expenditures.

STATE HIGHWAY CONSTRUCTION AND MAINTENANCE EXPENDITURES

diagnosis and prompt treatment, declared the American Society for the Control of Cancer.

The growth of the Women's Field Army has been rapid. Divisions are now underway in forty-six states, cancer information centers—local units of the army—have been established in more than half the counties of the country. Cancer control is receiving more attention than ever before.

A beginning has been made, but only a beginning in this peacetime war. Approximately 150,000 men, women and children were destroyed by cancer in 1939. The needs in the field are great: more clinics, more funds for research, more facilities for indigent patients, above all, more education for the general public.

Working under the supervision of physicians and other experts, women are the leaders and organizers of the fight against cancer. However, the most paradoxical thing about this complex disease is that we cannot leave its control to leaders, to research workers, or medical men. We must all do our bit.

The Field Army suggests three measures that each one may adopt and so play a part in cancer control:

1. Have a comprehensive physical examination once a year, however well one feels. Women over thirty-five years of age should have what the American Society calls the B. P. examination, covering the breast and pelvic areas, semi-annually.

2. Memorize the cancer danger signals, early and usually painless symptoms that may mean the disease is present and should always mean a visit to a physician. They are: any lump or thickening, particularly in the breast, any irregular bleeding or discharge from any body openings; any persistent and unexplained indigestion; any sore that does not heal normally, especially about the tongue, mouth or lips; any sudden change in the form or rate of growth of a mole or wart.

3. Ask your wife to enlist in the Women's Field Army in April, set aside by Special Act of Congress as Cancer Control Month, and so help the army carry on its work of education to save lives.

January Construction Contracts

Private building and engineering contracts awarded in the 37 eastern states during the month of January amounted to $103,659,000, according to F. W. Dodge reports. This was almost exactly equal to the January 1939 figure, which was $103,757,000. There were moderate increases in private non-residential building and engineering work and a moderate decrease in private residential contracts.

Contracts for publicly financed construction declined 37 per cent in dollar volume, as compared with January of last year, with a moderate increase in public residential building and decreases of considerable magnitude in public non-residential building and engineering work. The grand total of January contracts for all construction, $196,191,000, was 22 per cent under the figure for the corresponding month of 1939, which was $251,673,000.

Commenting on the January record, the Dodge reports state: "It is of interest to note that while the dollar volume of residential building contracts declined moderately as compared with January 1939, there was a 14 per cent increase in number of new family dwelling units contracted for, and that there was an increase in contracts for manufacturing buildings.

NOT in the *Contract*

The modern young mother in the day coach was proudly feeding her first-born the good old-fashioned way.

A drunk with one of those conversational jags wobbled past from the smoker, and paused to observe the phenomenon.

Drunk: "Lady, thass a fine baby. Yeah, a fine baby. Whadya feed him?"

Beaming Mama: "Oh, just milk and tomato juice."

Inquisitive Imbiber: " At's fine. Fine! Which un's the tomato juice?"

A policeman was questioning a man pinned under his car in an accident.

"Are you married?"

"No," was the answer, "this is the worst fix I was ever in."

"Pardon me, young lady, in the matter of your dress, don't you think you could show a little more discretion?"

"My gosh! Some of you fellows aren't ever satisfied!"

"Have you ever been X-rayed?" asked one young gal to another.

"No," was the reply, "but I've been ultraviolated."

A contractor friend of ours recently proved himself a master in the fine art of flattery.

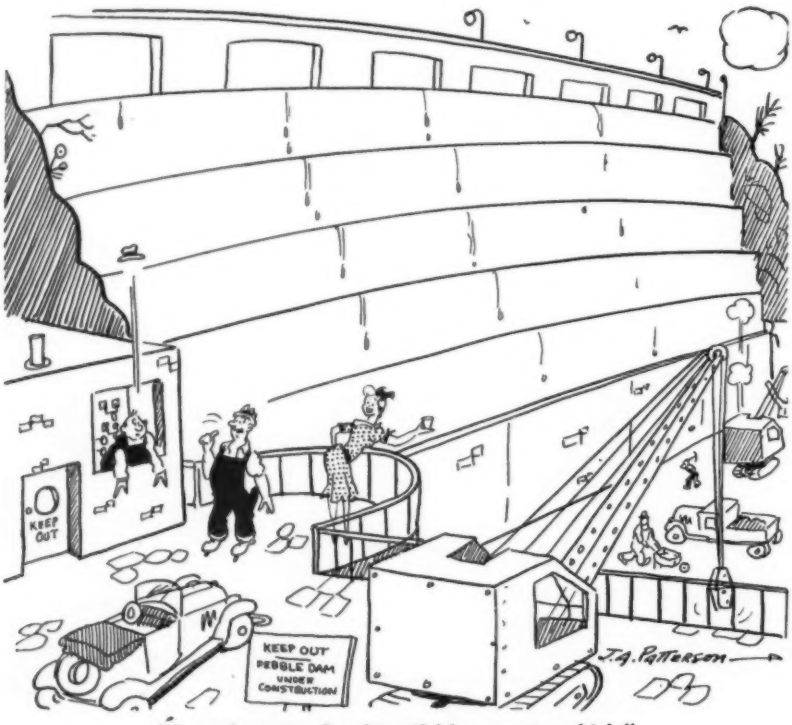
It seems that one day, deeply engrossed in the difficulties of his latest bid, he entered an elevator and forgot to take off his hat. There was only one other passenger in the elevator, a rather fussy, middle-aged woman, and she snapped:

"Don't you take off your hat to ladies?"

"Only to old ones, ma'am," our friend replied, with a little bow.

Discussing the type of milk which should be supplied to school children, the chairman of the town's health committee said:

"What this town needs is a supply of clean, fresh milk, and we should take the bull by the horns and demand it."



"Open the gates, Gus, beautiful here wants a drink."

As an encore to last month's list we offer a few more excerpts from the reports of Social Service investigators:

Applicant took job as janitor in home for the working girls—lasted three weeks.

Nice quiet home family. Dorothy has been out since July.

Applicant and wife are illegally separated.

Roomer pays no board as he usually acts as godfather.

The people have religious pictures all over the place, but seemed clean, however.

Man recently had operation but is able to hold any position he assumes.

Sophie is married to a sailor and her whereabouts are unknown.

Woman ailing at present—eyesight poor—does house work when able to find it.

Apartment crowded and untidy. Saw evidence of girl in clothing.

Woman says they are a delicate family and must have steamed apartment with eggs and oranges.

Applicant has one child, Ruth, who is three months old and owes 12 months' rent.

Fashion Note: They're wearing the same things in brassieres this year.

The minister read the text: "The light of the wicked shall be put out."

Instantly the church was in darkness. With scarcely a pause, the minister continued: "In view of the startling fulfillment of this prophecy, we will spend a few minutes in silent prayer for the electric light company."

"Do you know what good clean fun is?"

"No, what good is it?"

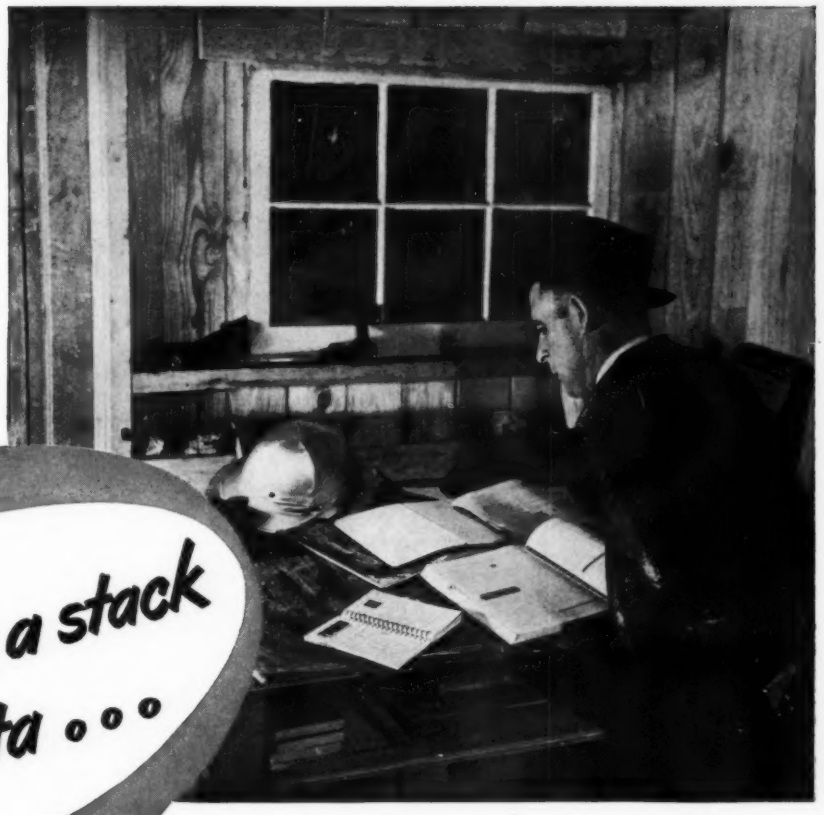
An American went into a London restaurant and sat down at a table.

He: What's good today?

Waitress: Rhubarb, rutabagas, ravioli, rice and roast.

He: My! You certainly roll your rrs.

Waitress: Maybe it's these high heels I'm wearing.



Stumped by a stack of Rope data . . .

ask your Bethlehem distributor

One of the most important steps in getting maximum life from wire rope is selecting the proper size, grade and construction of rope. With the thousands of different ropes that are made, with the hundreds of different machines using rope, this is not always a simple job.

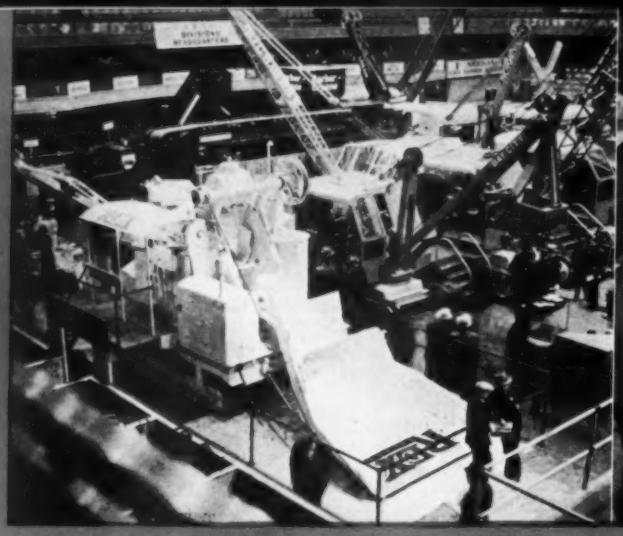
When you replace your next rope, why not make sure that the new rope is matched to your equipment. A convenient, practical way to do this is to check with your Bethlehem Wire Rope distributor. He knows wire rope. He has mill recommendations for practically every type, make and model of excavating machinery. If some unusual problem is involved, he has only to ask, and a mill-trained engineer will arrive at your job.

This engineering service is one of many reasons why it pays to deal with Bethlehem distributors when buying wire rope. A letter to Bethlehem Steel Co., Bethlehem, Pa., will bring you the names of the nearest distributors of Bethlehem Wire Rope.

BETHLEHEM STEEL COMPANY

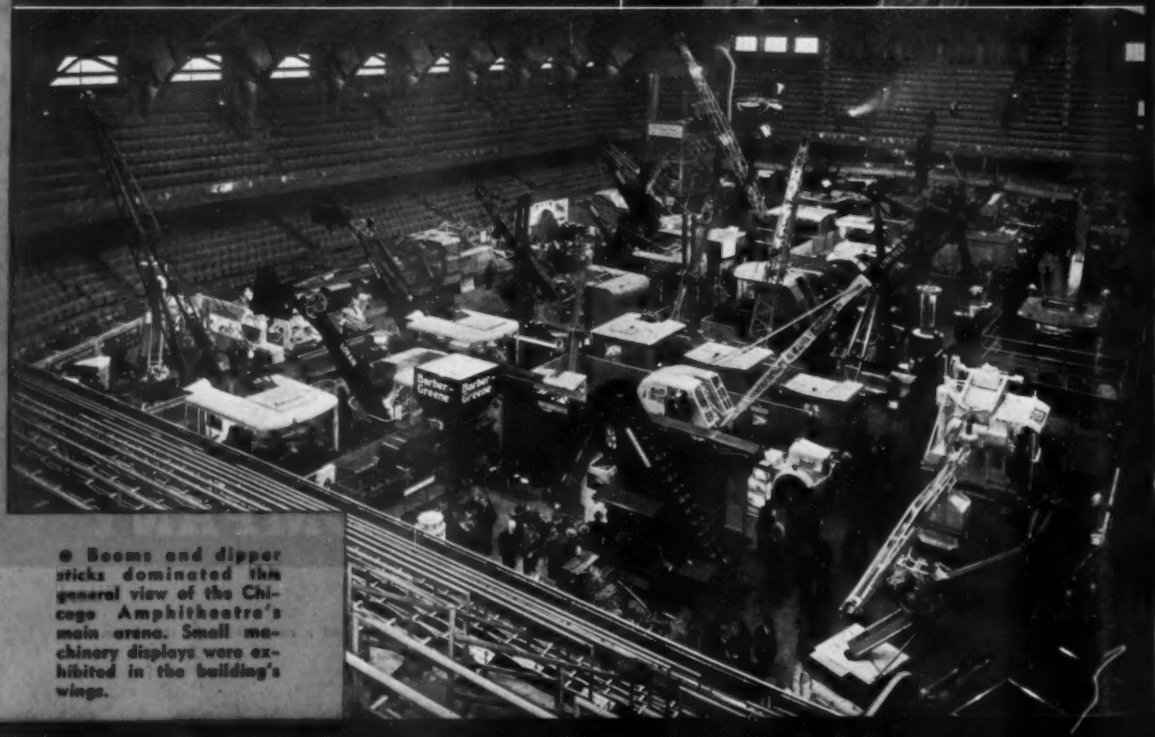
For your convenience in writing to Bethlehem Steel Company, you will find a card bound in this issue.

A. R. B. A. ROAD SHOW



● A corner of the main arena. In the foreground an immaculate Rex paver. Below: A Caterpillar-mounted Athey MobiLoader supports a dipperful of smiling exhibit hostesses.

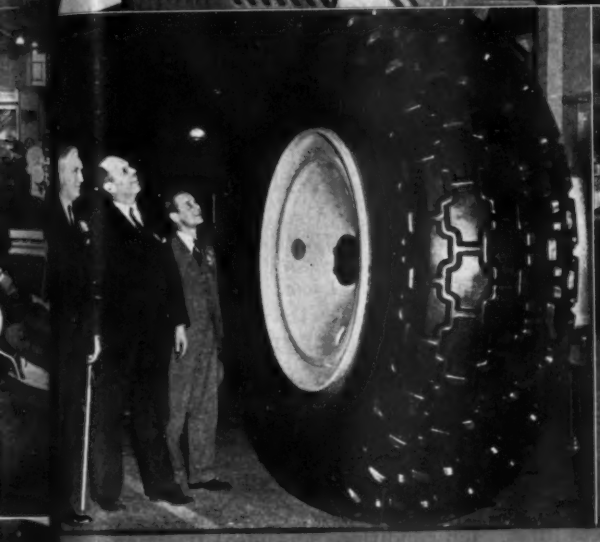
● ARBA Conventioneers kept the registration girls busy as they enrolled for the 1940 session at the Chicago Amphitheatre. Over 48,000 attended. Below: The "boys" look over the Adams exhibit. The 300 exhibits at the show covered 8½ acres of floor space and contained about $5,000,000 worth of equipment.



● Booms and dipper sticks dominated the general view of the Chicago Amphitheatre's main arena. Small machinery displays were exhibited in the building's wings.

CHICAGO ★ 1940

● These charming "Scotch Lassies" were a decidedly decorative addition to the Cletrac exhibit, and successfully attracted the attention of many a contractor and photographer.



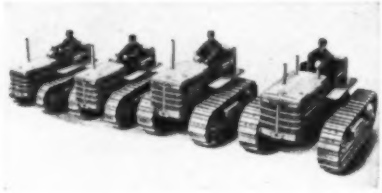
● (L to R) John W. Thomas, Firestone president, R. G. LeTourneau, and H. S. Firestone, Jr., inspect the new 9-foot Firestone tire. Below: International's four size range of TracTracTors is given an interested inspection by the convention crowd.

● Roadbuilders examine bullgraders, bulldozers, and scrapers at the Bucyrus-Erie tractor equipment booth. Below: This model plant installed by The Simplicity System Company attracted the attention of many spectators.

Equipment you ought to KNOW ABOUT

New Crawler Tractors

The International Harvester Company, Chicago, Illinois, has placed on the market three new crawler TracTracTors. They are Model TD-6, smallest of the three



new models; the TD-9, next in size; and the TD-14, largest of the three.

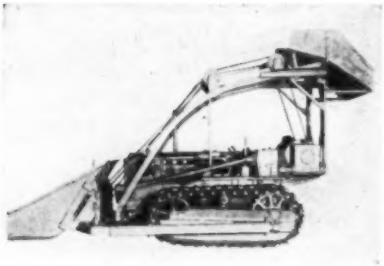
Thus, with the larger TD-18, previously announced, the International Diesel crawler line now consists of four sizes, with respective maximum belt and drawbar horsepower ranging from 30 for the TD-6 to approximately 84 and 70 for the TD-18.

New Athey MobiLoader

An entirely new piece of loading equipment, known as the Athey MobiLoader has just recently been announced by the Athey Truss Wheel Company, 5631 West 65th Street, Chicago, Illinois.

The new Athey MobiLoader is a utility tool, designed for use by contractors—state, county, city and township highway departments — oil fields — in stockpile loading—in coal yards—for foundries—and for a variety of industrial plant uses. To mount the Athey MobiLoader no changes are necessary either in new "Caterpillar" Diesel Tractors or in corresponding models of "Caterpillar" Tractors now in use.

The MobiLoader has a 1½-yard



bucket. There is 7′ 6″ clearance under the chute for rear dumping. For front dumping the load can be discharged at any point from the ground to a height of 7′ 6″. The device is cable operated, and is a ball-bearing mounted, worm-gear transmission unit. Control is from the tractor seat, one lever controlling all rear dumping, and front dumping being obtained with a simple adjustment.

According to Athey officials, the Athey MobiLoader has been "pretested" in the field, and has been working in conjunction with trucks, railroad cars, flumes, etc. It is reported that the MobiLoader established new records for exceptionally fast and low-cost operation, as well as for flexibility and maneuverability in these uses. In operation the MobiLoader, according to the manufacturer, dumps to the rear without the necessity of maneuvering or turning the tractor in any way.

"Instant Heat"

A new electric solderer, recommended for all kinds of light soldering, is announced by the Ideal Commutator Dresser Company, 4104 Park Avenue, Sycamore, Illinois.

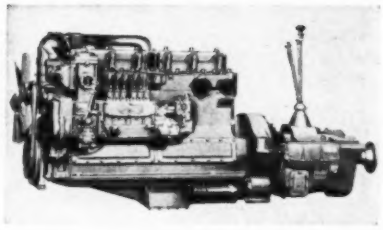
Being hardly larger than a lead pencil and called "Instant Heat," this tool is claimed to be ideal for all kinds of light soldering found in service work. Complete unit includes transformer and soldering tool. Size of the tool is only 6¾″ x ⅝″ in diameter. Power consumption is approximately 80 watts. Shipping weight 2½ lbs.

"Caterpillar" Truck Engine

Caterpillar Tractor Company, Peoria, Illinois, has announced its entry into the automotive field, with a 90-horsepower diesel truck six cylinder engine.

For replacement installations, "Caterpillar's" Model D468 engine is offered as a complete unit, equipped with a five-speed Spicer No. 5351 transmission, and clutch.

The engine is a four-stroke, valve-in-head, water-cooled model with a bore of 4¼″ and a 5½″ stroke. Maximum horsepower is



developed at 1800 RPM. Maximum torque is 305 pounds-feet at 900 RPM. Piston displacement is 468 cubic inches.

Belt Cover Coating

The B. F. Goodrich Company, Akron, Ohio, is offering a new synthetic coating for belting covers, which on the basis of company tests, will greatly reduce the effects of aging.

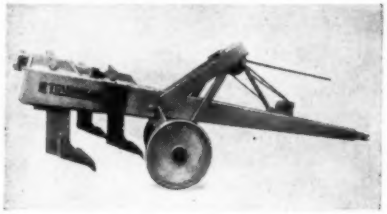
The new product, designated as Goodrich R-60-T protective coating for conveyor belting, has, according to the manufacturer, successfully withstood a series of weather tests and is now ready for industrial use.

LeTourneau Rooter

The R. G. LeTourneau Company of Peoria, Illinois, recommends to contractors its 9150 lb. Heavy Duty K3 Rooter. The new Rooter comes equipped with three teeth which have a maximum depth of 28″, each being removable to meet job conditions and ideal fragmentation. Because of its simple T construction and the fact that it is arc welded, greater strength is claimed.

Rooting with this tool is said by the manufacturer to break up the tougher materials so as to permit contractors to get tractor-scraper economy in rock, shale and hardpan.

Further information on the K3 Rooter may be secured from Le-



"Our results so far indicate that New RPM DELO can be highly recommended for Buda Diesel Engines, and is a superior lubricant in every respect."

One look at The Buda Company's tough engine tests—and you'll see why! Two engines, a six-cylinder and a four, were broken-in and run on New RPM DELO—many hundreds of hours at full speed. On top of that the six-cylinder Buda was pushed 10% above normal rated horsepower.

But this punishment didn't mean a thing to New RPM DELO! Every piston ring was free—power seal perfect. Yet Buda has found that other oils tested under the same conditions of speed and load would stick rings long before the completion of these tests.

More! Buda's bearings showed no sign of corrosion. And New RPM DELO brought pistons, rings, liners through this severe run smooth and *unworn.*

Users of all types of Diesels as well as leading engine manufacturers are proving the exceptional performance of New RPM DELO. Make money by choosing it for *your* Diesel equipment.

New "RPM" Diesel Engine Lubricating Oil is available everywhere in the gray barrel with the blue head

RPM
REG. TRADE MARK
DIESEL ENGINE LUBRICATING OIL

Order from Your Nearest Distributor as Listed Below:

IN THE UNITED STATES

RPM DELO:
The California Company (Montana only)
Humble Oil & Refining Company
Standard Oil Company (Indiana)
Standard Oil Company (Nebraska)
Standard Oil Company of California
Standard Oil Company of Texas
Utah Oil Refining Company

Diol RPM DELO:
The Carter Oil Company, Tulsa, Oklahoma
Colonial Beacon Oil Company
Standard Oil Company of Louisiana
Standard Oil Company of New Jersey
Standard Oil Company of Pennsylvania

Kyso RPM DELO:
Standard Oil Company (Inc. in Kentucky)

Signal RPM DELO:
Signal Oil Company

Sohio RPM DELO:
The Standard Oil Company (Ohio)

IN CANADA & NEWFOUNDLAND

Imperial RPM DELO:
Imperial Oil Limited

IN BRITISH COLUMBIA & ALBERTA

RPM DELO:
Standard Oil Company of British Columbia Limited

THROUGHOUT THE WORLD

RPM DELO is available through distributors in more than 100 countries.

STANDARD OIL COMPANY OF CALIFORNIA

For your convenience in writing to Standard Oil Company of California, you will find a card bound in this issue.

Tourneau and Caterpillar Dealers or by writing R. G. LeTourneau, Inc., Peoria, Illinois.

Motor Grader

The Austin-Western Road Machinery Company, Aurora, Illinois, has recently announced its new model "99" motor grader. This grader, with special attachments

offered by the manufacturer, can be converted to a grader, finisher, rotary broom, disc harrow, or roller.

It is claimed the Model "99" Finisher can grade and slope simultaneously, as each blade can be used at the same time, or operated independently; in a ditch or on a grade. The slope angle can be changed at will, without stopping the grader and will also slope around curves.

New Earth Moving Tires

The B. F. Goodrich Company, Akron, Ohio, announces three new tires for earth moving equipment.

For the drive wheels of tractors hauling semi-trailer wagons in soft and muddy going, Goodrich offers its Earth Service type tire with self-cleaning cleats in a balanced non-skid tread pattern assuring sure-footed traction.

The new Rock Service earth mover, as the name implies, is intended for quarry, strip mining, logging and similar operations, and excavating service where substantial amounts of rock must be moved. Featuring a broad flat tread with cleated pattern for traction, the tire has tough side wall curb strips for additional strength against abuse, according to the manufacturer.

For the free rolling wheels of scraper buggies, a Trailer Service type tire was designed providing flotation as well as resistance to cuts, snags and bruises.

Rubber Preservative

The Alemite Division of Stewart-Warner Corporation has recently announced its latest addition to their line of automatic products—a rubber lubricant and preservative, which will also eliminate many of the hard to find squeaks and rattles caused by friction on a car or truck. It is for the preservation of rubber shackles, mountings, grommets, linkage, insulation strips, and all rubber parts exposed to wear and weather. Non-poisonous, non-caustic, and harmless to upholstery or car finish, the new Alemite rubber preservative helps prevent rubber from drying out and acts as a deterent to any corrosive action caused by contact or exposure to oil or gasoline, Stewart-Warner chemists claim.

Aridifiers

The Logan Engineering Company, 4912 Lawrence Ave., Chicago, Illinois, announce that their line of Aridifiers for removing moisture and oil from air and gas lines is now complete in all sizes from $\frac{3}{8}$" to 10".

All sizes are simply constructed, easy to install in any line, interior or exterior, operate without back pressure and require no maintenance or attention other than a periodical clean-out, is the maker's claim. According to the manufacturer, they greatly extend the

service life of tools powered by compressed air and eliminate troubles arising from condensation, freezing, etc.

Gar Wood Scraper

Gar Wood Industries, Inc., Detroit, has placed a new, low-priced, dirt-moving, utility scraper on the market, according to Jack B. Haile, manager of the Road Machinery Division. The new model 23 Gar Wood-Continental, 3-yard, 2-wheel, hydraulically-operated scraper is designed specially for use by counties, townships and small contractors and replaces antiquated equipment such as fresnos, tumblebugs and bottomless scrapers.

"Model 23 handles the many odd jobs which must be completed in fast time and at lowest operating costs," Mr. Haile says. "This new scraper, used with Allis-Chalmers models M and WM and other tractors of similar horsepower, digs under positive pressure in all kinds of soil—loads, hauls and back dumps.

Raising and lowering of the cutting blade, closing the load and dumping are accomplished while in motion. Twin, two-way-action hydraulic jacks actuate the digging bucket and provide accurate and fast control by the tractor operator of all digging, loading and carrying operations."

Dodge Trucks

To meet the needs of truck users, the Dodge Division of Chrysler Corporation is now designing and building job-rated trucks, which, it is claimed, fit 97.3 per cent of the nation's hauling jobs. Dodge is producing 1940 job-rated trucks in six different capacities, ranging from $\frac{1}{2}$-ton to the 3-ton Dodge diesel trucks. These job-rated trucks are powered by six different engines, sixteen gear ratios are available, and 96 standard chassis and body models are offered in 17 different wheelbase lengths.

To facilitate the installation of Dodge trucks in all kinds of hauling, all Dodge dealers and salesmen have been given special instructions and are furnished with a standard Dodge Job-Rated proposal form, containing simplified, complete data on how to help the

A "WIPING" DANDY!

WHEN YOU see the size of the loads a "Caterpillar" Diesel Tractor handles in front of a bulldozer . . . the little low-cost fuel it needs . . . its time-cutting maneuverability . . . and its ruggedness and stamina that save headaches and expense on maintenance-repairs, you know why it has earned the name of "the wipe-up tractor!"

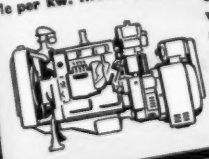
Here's one—a "Caterpillar" Diesel D4 equipped with a LaPlant-Choate Roadbuilder—owned by the New England Coal and Coke Company of Norfolk, Virginia. Used for cleaning up after a large steam crane, it sticks to its job 8 hours a day . . . and consumes only 10 gallons of low-cost fuel!

Check over the money you've spent for wiping-up in the last year. Then give the figures to your "Caterpillar" dealer and ask for an estimate of how much you would be in pocket with a "Caterpillar" Diesel Tractor! Or write the factory.

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

MAKE YOUR OWN LIGHT AND POWER FOR LESS THAN "CITY RATES"

"Caterpillar" Diesel-Electric Sets—low-priced, compact, complete, easy-to-install packages—can supply electric current for less than 1¢ per kw. hr. . . . depending on their average loads and the local cost of Diesel fuel. No switchboard, automatic voltage-regulator, or other external control apparatus needed. Simply set them up and start them. Completely self-regulating. Available from 13 to 66 kw. Talk to your "Caterpillar" dealer about this new source of low-cost power for your camps and jobs.



CATERPILLAR

REG. U.S. PAT. OFF.

DIESEL ENGINES AND ELECTRIC SETS

TRACK-TYPE TRACTORS • ROAD MACHINERY

truck operator select the right truck to fit his job.

Self-Propelled Air Compressors

Schramm, Inc., West Chester, Pennsylvania, has recently developed one of their standard small air compressors for replacement of standard Ford V-8 engines in Ford Trucks or other similar applications. The use of this replacement package is similar to the use

of the modern diesel engine "conversion"; in other words, the Ford engine is removed from the truck and a combined engine and air compressor is replaced under the hood of the truck. No payload space is taken up by power take-off and compressor on the rear of the truck, and the truck uses the same engine power cylinders for power for propulsion and for driving the air compressor. By merely manipulating several controls in the cab of the truck the unit is converted from an air compressor to a truck and vice versa without even stopping the engine, according to the manufacturer.

The unit delivers 55 cubic feet of air per minute at 100 pounds pressure, which, it is claimed, is sufficient for one heavy duty paving breaker, or two small demolition breakers, two backfill tampers, two clay spades, five or more spray guns, sandblast, several rotary pneumatic tools and many other air tools.

Basically the unit is a four cylinder engine and a four cylinder air compressor in an eight cylinder block. The power cylinders are No. 1 and No. 4 on one bank and No. 2 and No. 3 on the other bank to give equal power and equal load. When operating as a truck the four power cylinders drive the truck through the standard Ford clutch and transmission and the four compressor cylinders are shut-off so that no power is consumed and no air is compressed.

Rubber Wheelbarrow Tires

The lowly wheelbarrow, first put on rubber with the development of a special type pneumatic tire some five years ago, now may be equipped with a solid tire with great load-carrying capacity for operations where tires are exposed to excessive abuse, The B. F. Goodrich Company announces.

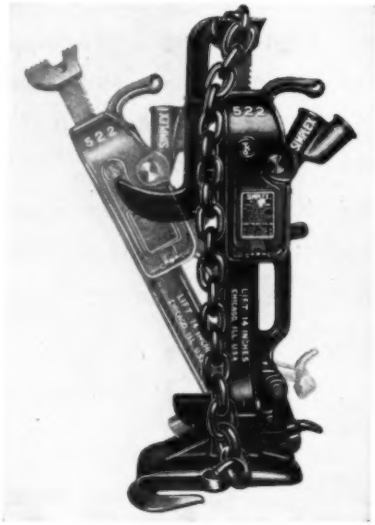
A 16x3 Goodrich Vulc-On tire, cured directly to the wheelbarrow wheel, has been perfected. Installations have been made in steel mills, foundries, automobile plants and other industries where tires often are overloaded or get undue wear.

Concurrent with the introduction of the new solid tire, Goodrich announces its Nu-Seal wheelbarrow wheel, for pneumatics, with bearings sealed against dust and dirt and designed for heavy duty service in brick plants, pottery firms and other ceramic industries.

The new wheel has special bearing seals, which by preventing the entrance of dust and grit, eliminate the devastating wear on bearings and axles, according to the manufacturer.

Simplex Emergency Jack

Templeton, Kenly & Company, 1020 South Central Avenue, Chicago, have placed a new light-weight single acting, automatic raising and lowering emergency jack on the market.



This jack, which is designated No. 522, has a capacity of 5 tons and meets the demand for a smaller emergency jack with all of the features of the larger jack, according to the manufacturer. The No. 522 tilts on its base, when the base pawl is disengaged, permitting angular jacking or pushing and pulling. It lifts on the cap, the auxiliary shoe, the toe lift and at any intermediate point by using the 4½ ft. 7/16 BBB chain, which is fitted with a grab hook, as a sling.

New Buster Tools

The Sullivan Machinery Company offers its new "Blue Point" Tools for Concrete Busters, ac-

Chisel—Conventional Type

Chisel—Arropoint Type

cording to the manufacturer. The "Blue Point" Tools are of premium round steel, made under accurately controlled forging and heat-treating conditions and ground to eliminate every surface defect.

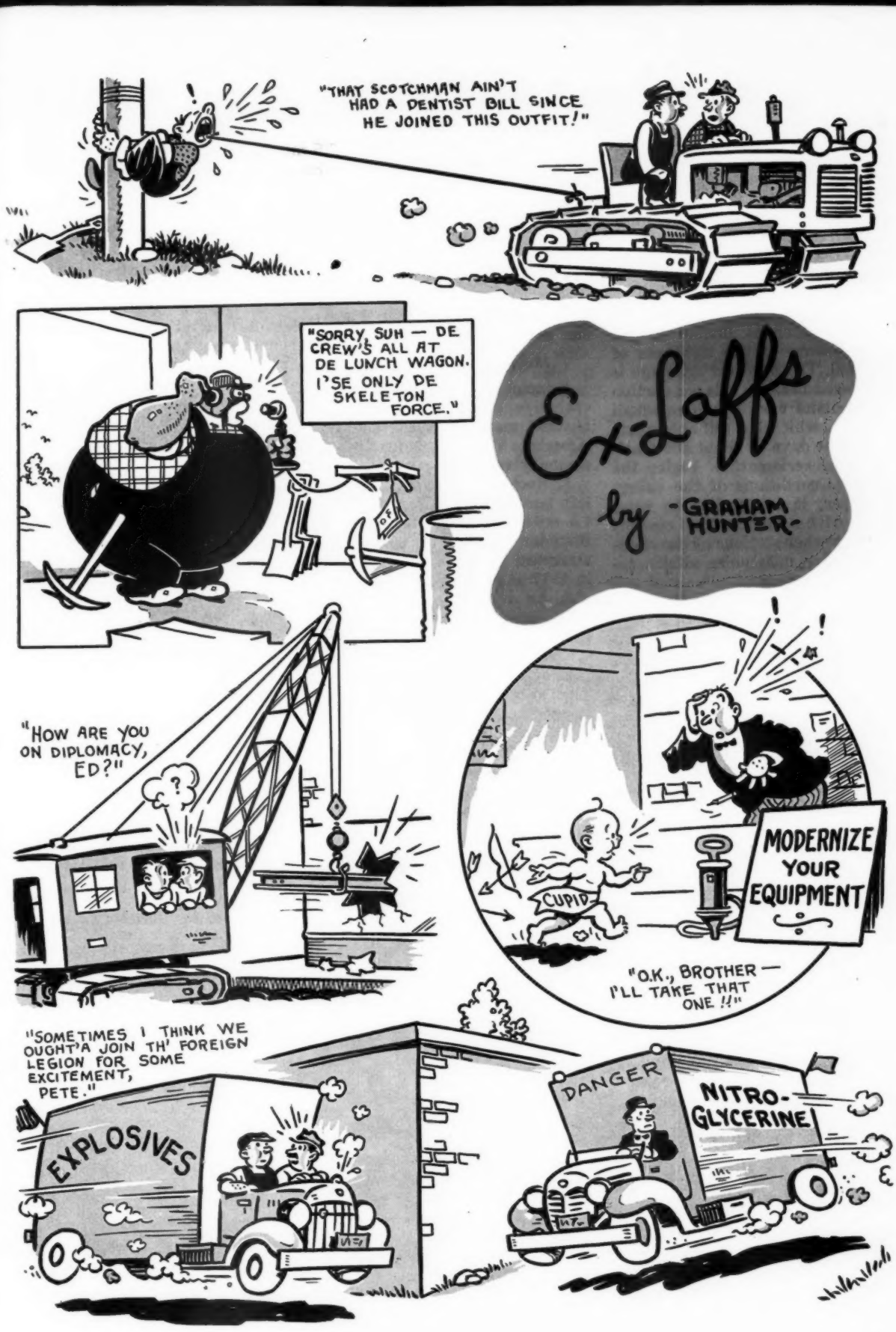
Emergency Light

Indefinite storage before actual usage is no longer detrimental to a new emergency electric light according to Triumph Explosives, Inc. of Elkton, Maryland. Designed strictly for emergencies, the new battery is similar to the standard type of lantern battery both in appearance, method of contact and voltage capacity. The main difference is that the cells are packed and sealed in a dry state and activated only by striking the bottom of the battery against any solid object. No deterioration can possibly take place because, until the battery is struck, the cells do not become energized, it is claimed.

New Diesel Engine

A new light-weight 125 h.p. supercharged diesel engine, known as Model AAS-600, has been added to the Cummins Engine Company's line. The new supercharged AAS-600 operates on the four-cycle principle, has the same 4″ bore and 5″ stroke as their standard model A units, and develops maximum horsepower at 2200 rpms, it is claimed.

The supercharged Cummins diesel weighs only 10 lbs. per horsepower, including the weight of standard equipment, such as the fuel pump, electric starter, etc.


"THAT SCOTCHMAN AIN'T HAD A DENTIST BILL SINCE HE JOINED THIS OUTFIT!"
"SORRY, SUH — DE CREW'S ALL AT DE LUNCH WAGON. I'SE ONLY DE SKELETON FORCE."
Ex-Laffs
by -GRAHAM HUNTER-
"HOW ARE YOU ON DIPLOMACY, ED?"
CUPID
MODERNIZE YOUR EQUIPMENT
"O.K., BROTHER — I'LL TAKE THAT ONE !!"
"SOMETIMES I THINK WE OUGHT'A JOIN TH' FOREIGN LEGION FOR SOME EXCITEMENT, PETE."
EXPLOSIVES
DANGER
NITRO-GLYCERINE

Reclaiming the Good Earth

(*Continued from page 155*)

the entire area, although the lands requiring drainage are not continuous.

This drainage is not required because of a general rise of the underground water table typical of most irrigated lands, but to remove seepage from canals and excess water applied during irrigation, which is unable to get away owing to the tightness of the soil. The need for drainage is increased because a large portion of the land carries a high alkali content, which led soil specialists of earlier days to doubt the feasibility of reclamation. Under the climatic conditions of the valley, however, it is possible to raise crops with a higher alkali content than in other sections of the country. Barley, milo maize, alfalfa, asparagus, citrus fruits and all garden vegetables are raised in profusion.

The District is governed by a board of directors, including Evan T. Hewes, W. J. Gregg, Mark Rose, W. E. Young, and Charles Morrow. At the head of the executive staff is their young, efficient chief engineer and general superintendent, M. J. Dowd, under whose supervision all the maintenance and improvement of existing works is done.

The District maintains an extensive system of works. In addition to the usual construction problems of the maintenance and operation of a large irrigation system it must deal with the problem of sand and silt which is constantly carried in solution in the water brought in, and deposited in ditches. In obtaining water from an interstate and international stream on which water rights must be settled, flood control, storage and hydro electric works built, it must deal with other states and with the United States and Mexican governments.

Major District Features

Principal works of the District, exclusive of structures joining District mains with the new All-American Canal, include: (see accompanying map).

1. Rockwood Heading, on the left bank of the Colorado River, 1.5 miles above the International Boundary. This is a concrete structure with 75 openings, built in 1917 at a cost of $250,000.

2. An intake canal 6,000 feet long from Rockwood Intake to Hanlon Heading.

3. Hanlon Heading, a concrete regulating gate, formerly the main intake, ¼ miles above the international boundary.

4. The main canal, extending from Hanlon Heading through Mexico along the old Alamo channel. East of Calexico, California, this canal delivers water to canals which lead northerly across the international boundary of the District westerly to the channel of New River. It also carries water to Westside Main canal which, with its branches, crosses the international boundary west of Calexico to supply the lands between New River and the western boundary of the District.

5. Two main canals leaving the Alamo at Cudahay Check to water the central area of land irrigated in Mexico. One of these, the Cerro Prieto canal, leads back into Westside Main south of Calexico and Mexicali.

6. About 75 miles of protective levees in Mexico, of which 50 miles are provided with standard railway.

7. Pescadero Cut, 3.5 miles long, built to divert the entire flow of the Colorado River from the old channel of Bee River to the channel of Pescadero River.

Most of the gates, concrete structures and levees are permanent, requiring only the attendance of a caretaker. But in addition to these main structures is a matter of 3,000 miles of main canals, laterals and drains in the United States. One item, deep drains alone, totals 250 miles in length, cost $2,500,000 and involved the moving of 12,000,000 cubic yards of earth. An additional 137 miles of main canal have been constructed in Mexico. The maintenance of these ditches is one of the largest work items of the District.

Down the hallway of the District's efficiently designed main headquarters in Imperial, about four doors from chief engineer Dowd's office, is the office of W. E. Hartzog, superintendent of water diversion and drain construction. The matter of upkeep on the miles of canal in the District comes under his supervision. He does a land office business. Last year Mr. Hartzog's department spent $1,200,000 for maintenance alone.

Cleaning Silted Canals

A few years ago silt was quite a problem. Canals, irrigation ditches, and even some of the drains silted badly. To keep them clean and to dig the new ditches ordered for construction, the District purchased 32 Bucyrus-Ruth excavators. These machines moved

● **Below: Imperial's Eastside Highline canal forms the present eastern border of the district. Right: End of the line for part of the irrigation water—a 400 acre lettuce patch near El Centro.**

● Left: District storage yard at Imperial's headquarters. The old Bucyrus is still used for loading equipment. Above: Headquarters of the Imperial Irrigation district at Imperial.

along the levee tops with one track crawling over the opposite bank, scraping dirt away in their endless chain of buckets. They did the work designed for them, and did it well.

When these machines began to show signs of wearing out and some of them needed replacement, silt was no longer the problem it had been. Desilting works had been built near the Colorado River and water reaching the valley was comparatively clearer. While the District was confronted with a smaller amount of silt, however, sand seemed to increase.

The District then purchased four Bucyrus-Erie machines, three 17-B's, and one 21-B, and five Caterpillar RD-7 angledozers. With the purchase of these machines the ditch digging and maintenance business was revolutionized in a small way. The general practice at the present time is for the Bucyrus-Erie machines, each unit equipped with dragline, shovel and clamshell attachments which can be changed in the machine shop on a moment's notice, to dig clean the ditches. The excavated material is spoiled directly on top of levees on either side of the ditches. Following along behind, the RD-7 angledozers knock down and trim the spoil bank from atop the levee.

This combination throws out the dirt economically. The 17-B machine, working in average digging, equipped with a standard type ⅝ cubic yard bucket, knocks out 1,000 cubic yards of material per 8-hour shift. While most of the District excavation estimates are made on the basis of five cents per yard for material, Mr. Hartzog finds that the 17-B machine saves 20% and does the job for four cents a yard.

Several 10-B's, equipped with ⅜ cubic yard buckets, are used to great advantage on maintenance. These little machines skim along over the canal and ditch system, cleaning a half mile of ditch per 8-hour shift provided that not more than 800 cubic yards of sand, silt and sludge has settled in that half mile of ditch.

Machines Double as Cranes

In the course of a working season many small structures are set in the canals; some to divert the flow of water and some to check it. It is no longer necessary to send a machine out especially for these hoisting jobs. The District merely pulls a 10-B or a 17-B from a nearby location and sets the check in place. Some of the checks are heavy and make the little machines "rare up on their hind legs," but the operators, most of whom have been with the District for a number of years, know just about how much their machine can stand and always get the job done with a minimum of effort.

The dragline machines are admirably equipped to handle small fill jobs here and there where levees have eroded or where an occasional break has occurred. They are either moved in or crawl in themselves and can throw a lot of dirt in a small break in a short time.

Butane and diesel fuel are both used by the District. Most of the equipment carries only an 8-hour fuel supply and is serviced regularly by a service fuel truck which can always make the rounds wherever the machines are located.

The District has equipped the machines with a widened axle so that they can move along over small surface drains and ditches being dug. The axles on all the 10-B's were widened 18 inches, making the tread 9 feet from outside to outside. Equipped with a wide axle and dipper stick, these machines can move along with great speed excavating many of the ditches in the District built just as wide as the shovel dipper. The operators like this arrangement, too, for they never have to look backward at survey stakes set on the center line of a ditch. They can keep their eye on the stake line out in front and "let 'er roll."

One of the outstanding features of the efficiency of the District is the mobility of equipment. A special trailer has been designed to haul the Bucyrus machines to points too far distant for them to economically move. This trailer, pulled by a Dodge 1½-ton truck, moves in, loads a 10-B in ten or fifteen minutes and is ready to start it digging again twenty miles away with two hours to spare before lunch time.

At the main headquarters at Imperial, the District maintains its own machine shop, under the direction of master mechanic Vern Hess. Major and minor repairs and adjustments are made here to all equipment. Imperial is but 200 miles from Los Angeles and repair parts, if not stocked, can be brought out without delay from distributors located there.

Overcoming Vegetation Problem

The soils dug from the canals are fertile, and vegetation soon springs up on the levees, spreads

● Left: Cleaning an irrigation ditch. Note widely spaced "cats" that straddle the smaller ditches. Above: "Tempering" a section of the All-American. Note growth which must later be removed.

to the water and in time threatens to choke the open flow of water in the canal. For a number of years this vegetation was brushed out by a labor crew but now the District has two ingenious spray rigs. These machines move along fast, spraying a cloud of sodium chlorate on the green parts of growing trees, shrubs and weeds, effectively destroying the menace. Ditch-choking vegetation simply turns yellow and dies. Willows, sprayed with sodium chlorate, show some of the damaging effects after three years. One of the spray rigs is mounted on a trailer and pulled by one of the Caterpillars. One is built directly on a truck bed. Sodium chlorate, of course, is non-poisonous, and can be used on these canals from which source some of the drinking water is secured.

When some of the levees were made along canals and ditches, there was left in some instances unsightly borrow pits on one or both sides of the canal. The only way to correct this situation was to fill the borrow pit with dirt. From where? That was the problem, for to haul dirt into these places was too expensive for a district whose object is to furnish water, and which specializes in saving money wherever it can. So the District got a brilliant idea one day, and built a small lateral ditch from the main canal out into one of these borrow areas. A small sized stream of brownish water gushed into the borrow area and started to run down parallel to the canal outside the levee. The borrow pit was full of vegetation and what happened was precisely what the District knew would happen; the sand and silt carried in suspension was dropped and the borrow area began to fill up fast.

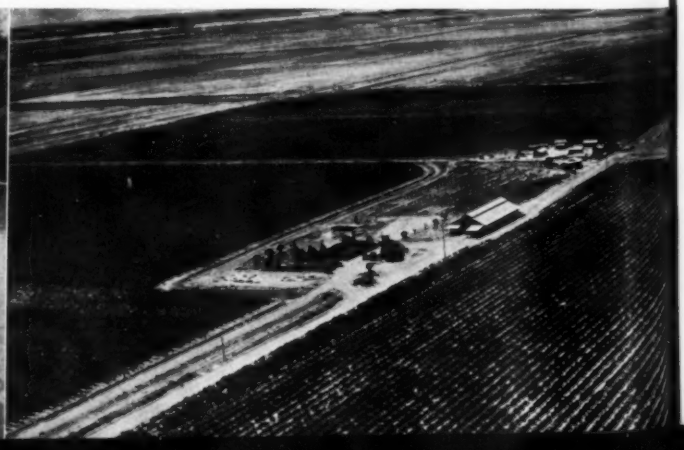
Miles down the canal, the clear water was routed into the main canal and another lateral built for a fresh supply of muddy water. Thus did the District solve another problem, however small, as it has constantly done ever since its inception. It seems to stick to the old adage "necessity is the mother of invention." The men in the District never seem to throw up their hands and quit; they stick around and get the problem, whatever it is, solved somehow. The casual visitor is at once impressed by this. It makes one believe that in the days of the Model "T," the District kept on hand a good supply of baling wire.

Take the moss problem. That one was easy. Canals which carried water for any length of time soon raised a crop of moss in the bottom of the ditch slowing down the flow of water. An inadequate water supply is not exactly typical of the well kept irrigation ditch. So on those ditches wherever practicable (and it is practicable on a number of them), the water supply was shut off for two or three days. The moss promptly dried up and died, water was turned back in, and everybody was happy. On ditches worked over by the Bucyrus-Erie machines, moss is of course removed with the sand and silt.

Providing 41 Inches of Rainfall

Through the District canals flows an enormous amount of water. Imperial Canal has a diversion capacity in excess of 7,000 second feet. On July 15, 1927, 6,612 second feet were routed through this canal. Eastside Highline, forming the eastern border of the District, has a maximum capacity of 1,800 second feet and runs within a few feet of the top. The gigantic All-American Canal, not yet completed, is designed for a 15,155 second foot capacity. Why all this water? There are a half million

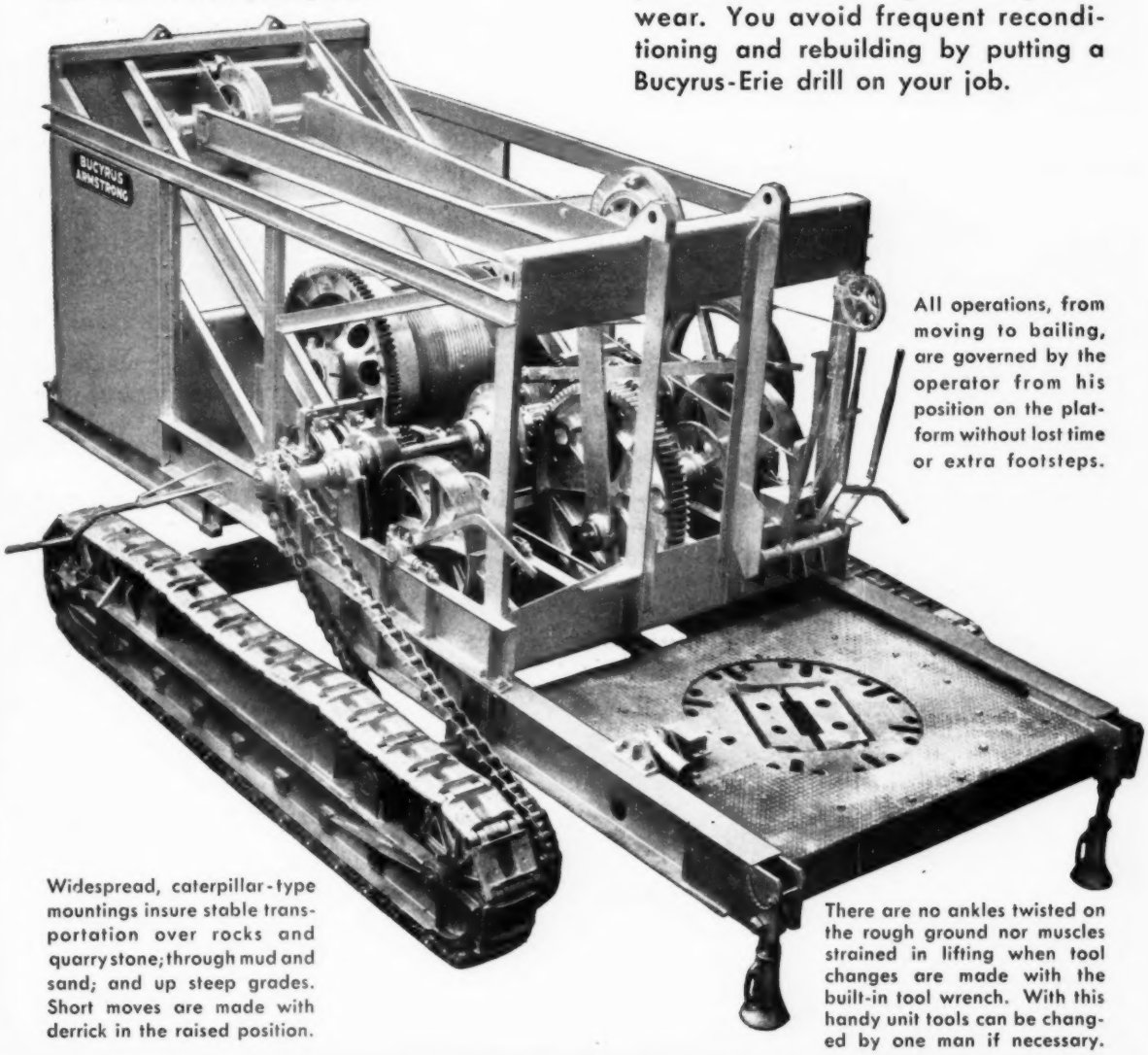
● Below: Small district drainage ditch and (center) a lateral canal. Right: Fertile fields of growing vegetables and fruit mark the success of the district's efforts.



The BOX FRAME Does it

BUCYRUS-ERIE blast hole drills are stronger and last longer because all parts are held in rigid alignment by the all-steel, all-welded BOX FRAME. Each individual part is locked into place within this sturdy structure so that, regardless of pressure or strain, it stays put for smooth running and long even wear. You avoid frequent reconditioning and rebuilding by putting a Bucyrus-Erie drill on your job.

All-welded Bucyrus-Erie drill frames support the mechanical parts from all angles just like a built-to-order packing case.



All operations, from moving to bailing, are governed by the operator from his position on the platform without lost time or extra footsteps.

Widespread, caterpillar-type mountings insure stable transportation over rocks and quarry stone; through mud and sand; and up steep grades. Short moves are made with derrick in the raised position.

There are no ankles twisted on the rough ground nor muscles strained in lifting when tool changes are made with the built-in tool wrench. With this handy unit tools can be changed by one man if necessary.

BUCYRUS-ERIE COMPANY
SOUTH MILWAUKEE, WISCONSIN

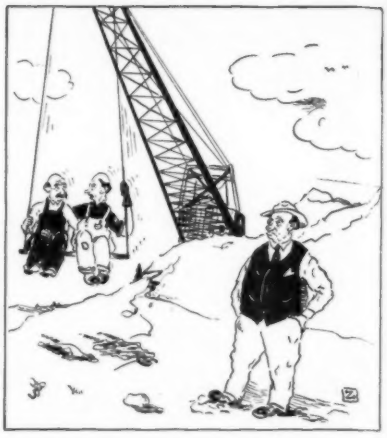
For your convenience in writing to Bucyrus-Erie Co., you will find a card bound in this issue.

acres of land under irrigation. And each acre, each year, takes an average of 3.5 acre-feet, or the equivalent of 41 inches of rainfall!

The next great area for development is East Mesa, east of the eastern limit of cultivation. This is still a desert; hot, dry, forbidding. The only inhabitants are the coyotes which come down to Eastside Main to drink, and the engineers who are beginning the construction of the Coachella Valley Branch of the All-American Canal. Again, this is a story of American pioneers — another story.

And so we follow the course of one tiny gallon of Imperial Irrigation District water. We follow it down the route of the Colorado from whence it came, through brilliant, blue Lake Mead; through Boulder Dam. We see it get muddy and roiled again. We see it converted into the litres of the Metric system in compliance with Mexican government regulations. We follow it on down past Kilometer 47, Kilometer 46, back into the United States and watch it gurgle past a gray toolhouse at the end of the day, where stand two Mexicans; one old and gaunt and weary; the other young and brown and slim.

. . . And Angelo and his son listen to the gurgle of the stream, knowing little of the story behind that gallon of water. They climb into a battered flivver, anxious to start homeward. For tonight is fiesta night—and tomorrow is another day.



"I told you the boss would frown upon this sort of thing."

Interstate Road Job

(Continued from page 149)

of good luck when we met General L. H. Callan, President of the Callan Construction Company, at the gravel pit of the Montaup Sand & Gravel Company, of which he is also president. General Callan who founded the Callan Construction Company some 26 years ago has also had an interesting military career. He served as a Captain of Infantry in the Spanish American War. Upon his resignation from the army in 1900 he became Commissioner of Public Works of Bristol, Rhode Island, a position which he held for a number of years. Later General Callan was called back into service in the World War and served as Colonel of the 107th Engineers of the 32nd Division (Michigan and Wisconsin National Guard) and made an enviable record. He received the distinguished Service Medal, the Silver Star, and the Purple Heart from the United States Government and the Croix de Guerre from the French Government. In addition to these decorations, he was honored by the following personal letter from General Pershing:

AMERICAN EXPEDITIONARY FORCES
Office of the Commander-in-Chief
France, June 7, 1919

Colonel Luke H. Callan, Engs.
Care of Chief of Engineers,
Washington, D. C.
My dear Colonel:

As the closing days of the American Army effort in France draw near, it gives me great pleasure to express to you my personal appreciation and the appreciation of your comrades for your loyal and energetic services in the American Expeditionary Forces.

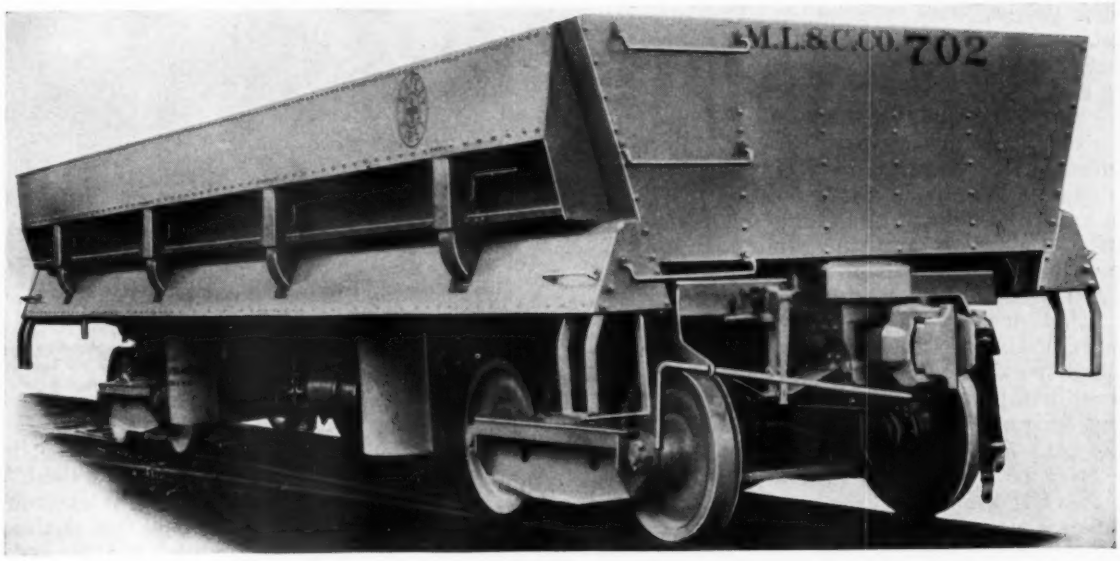
The able manner in which you handled the 107th Engineers during all the campaigns of the 32nd Division showed earnest application and intimate knowledge of your duties, and you are especially to be commended for your successful efforts with your regiment.

Sincerely yours,
Gen. J. Pershing.

With General Callan we met Joseph F. Foley, who is general superintendent of the Callan Construction Company. Mr. Foley has had years of experience in the construction industry, having been a superintendent on the New York Barge Canal and other large projects throughout the country. His brother Thomas J. Foley and nephew Jack Foley are superintendents on some of the larger projects handled by the company.

● Placing reinforcing steel for the 70-foot concrete box culvert that will allow drainage of Sawdy Pond.

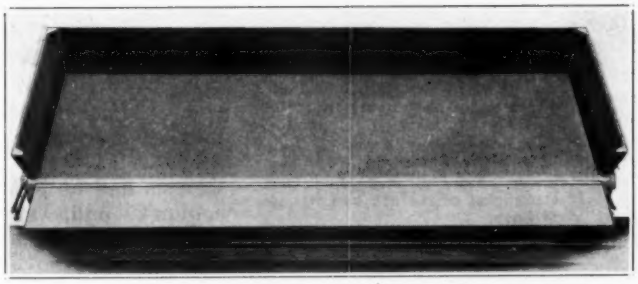
DIFFERENTIAL AIR DUMP CARS
WITH
AXLESS TRUCKS



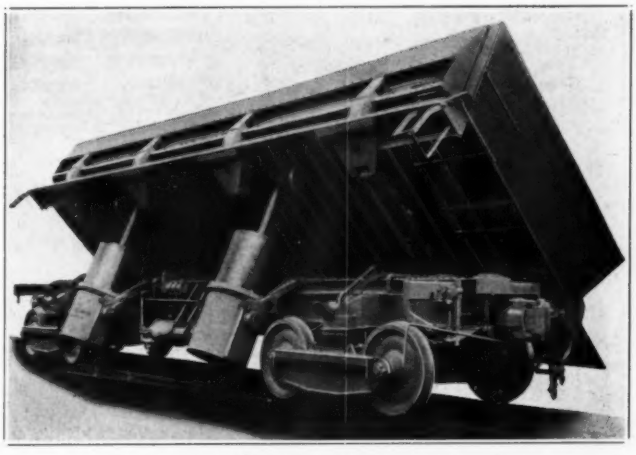
- **Dumps quickly to either side by compressed air.**
- **Doors open and close automatically.**
- **Double fulcrum design provides stability—No locking mechanism necessary.**
- **Down-folding doors chute material far away from track.**
- **AXLESS trucks are free wheeling —Reduce wheel and rail wear— Cut down rolling resistance.**
- **AXLESS trucks provide high degree of roadability over poorly lined and surfaced track.**
- **AXLESS trucks are lighter and have anti-friction bearings.**

Write for Bulletin D-47

Burden-bearing Locomotives — Mine Locomotives — Mine Cars — Stockpile Cars — Larry Cars — Complete Haulage Systems.



Steep dumping angle and smooth floor and clear discharge opening for any size or class of material.



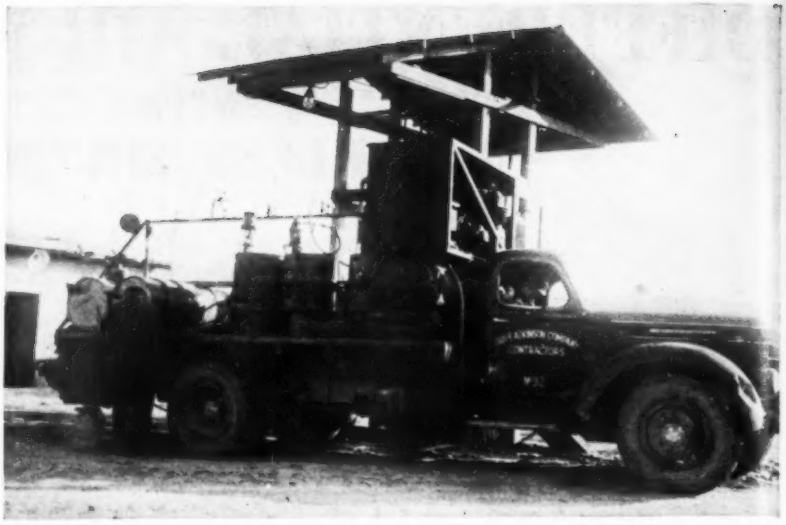
Sturdy construction — high payload ratio.

DIFFERENTIAL STEEL CAR CO., FINDLAY, OHIO

For your convenience in writing to Differential Steel Car Co., you will find a card bound in this issue.

Thomas Foley was a superintendent during the construction of the Cape Cod Canal. The entire personnel of the Callan Construction Company have had many years of experience in the construction business. Frederick V. Waterman is director of the Department of Public Works, State of Rhode Island, and George H. Henderson is chief of the Division of Roads and Bridges.

Resident engineers on the various Rhode Island projects described in this article were E. T. Anthony, who was in charge of the construction of the Nannaquaket Causeway and the Old Main Road, as well as the westerly section of the Bulgarmarsh Road; Francis Holbrook, Jr., who was in charge of the construction of the central portion of the Bulgarmarsh Road; Howard Barnes, Edwin Young and Charles Trumbull, who were in charge of the construction of the easterly portion of the Bulgarmarsh Road; and William Cole, who was in charge of the reconstruction of the Sakonnet Point Road, formerly the Old Main Road.



● Handy, mobile greasing units of this type are used to service the heavy equipment on the job, saving a great deal of time.

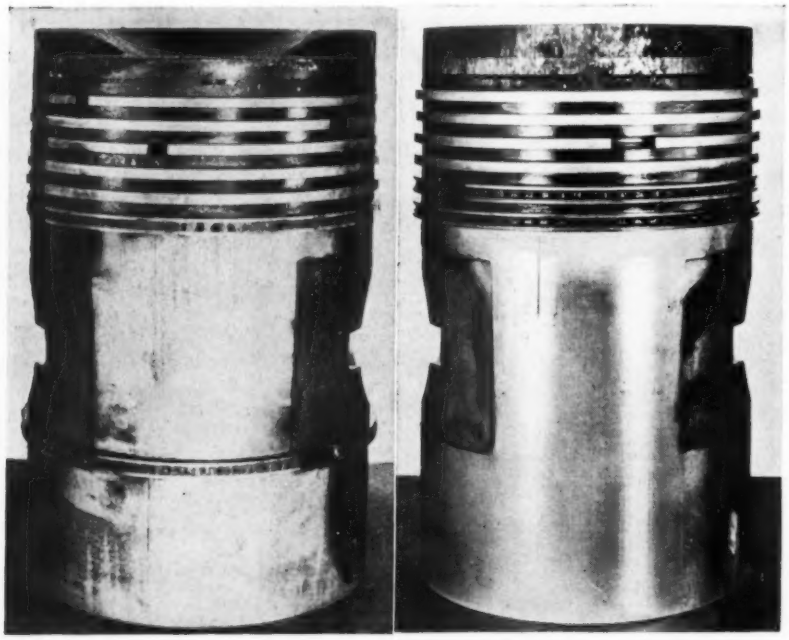
Diesel Tips

(*Continued from page 152*)

efficiency. There isn't much that can be done about it except use a larger engine, but it saves a lot of worry if the cause of the trouble is understood and not blamed on something else. This was the case with one Middle West contracting firm in their first Western contract, the construction of a mountain road. Complaints and calls for service were frequent, the shovels had no power, the trucks couldn't pull, and everything overheated. They had grounds for complaint, but it wasn't the fault of the equipment. When you figure that at 6,000 feet engine efficiency is reduced to 78%, and that they were operating at altitudes exceeding that, it is easy enough to see why the equipment was not to blame. A 90 h.p. tractor, for example, becomes a 70 h.p. at 6,000 feet. The reason, of course, is lack of oxygen. Most engines are adjusted to operate at or near sea level, and without changing the compression ratio and the bore and stroke of the engine, which is ordinarily not practical unless equipment is permanently installed, about the best thing to do is to use the best fuel you can get.

The subject of diesels is a big one, and only a general treatment of some of the important points has been attempted here. Important progress and changes are constantly being made in this field. It is well to keep informed on such developments. You can be sure that as engine construction advances, involving closer clearances, lighter weights, and higher speeds, with their consequent increased pressures and temperatures, oils and fuels "tailor made" to fit will be increasingly important. For the same reasons careful maintenance and careful operation will be all the more necessary. In all things, remember, quality pays.

● Below: Effects of poor oil on a piston after 300 hours use. Note partially stuck rings, clogged oil rings, and heavy deposits. Right: This piston was run 500 hours under a full load in good oil. Note cleanliness of surface and freedom of rings.



International Harvester's

FOUR NEW DIESEL POWER UNITS

Above: The big 6-cylinder International UD-18 Diesel—100 h.p. at 1,400 r.p.m.—is a real money maker, no matter how you figure. Other models are the UD-6, UD-9, and UD-14.

INTERNATIONAL HARVESTER scores another success in the Diesel field with FOUR NEW DIESEL POWER UNITS. Here is *smooth, economical* Diesel Power in *compact, convenient form—easily installed, simple to operate,* ready to solve your power problems and cut your power costs. These engines range in size up to the UD-18, rated 100 h.p. at 1,400 r.p.m.

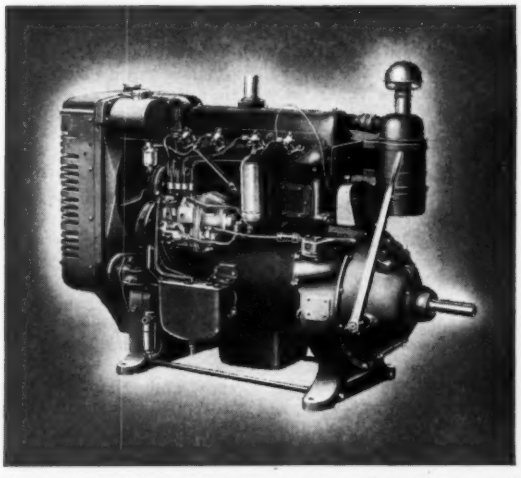
This good news for all users of power follows the introduction of International's FOUR Diesel TracTracTors for 1940. Now you can get International Diesel *design, quality, performance*—and International *full* DIESEL fuel economy—in *various sizes* of power units and crawler tractors.

International Diesels are engineered in every detail for *economy of operation, economy of maintenance,* and *long heavy-duty service.* See the nearby International industrial power dealer or Company branch for complete information. The International line also includes power units for gasoline, gas, and distillate operation.

INTERNATIONAL HARVESTER COMPANY
(INCORPORATED)
180 North Michigan Avenue Chicago, Illinois

FEATURE FACTS ABOUT INTERNATIONAL DIESELS

1. Full Diesel engine with full Diesel fuel economy.
2. Easy to install, simple to operate.
3. Basic parts can be attached or detached for a wide variety of equipment combinations.
4. Quick, easy starting.
5. Governor and extra-large flywheel maintain any engine speed desired, up to maximum governed r.p.m.
6. Long-lived, heat-treated alloy cylinders—replaceable.
7. Tocco-hardened crankshaft with precision-type, replaceable main and connecting-rod bearings.
8. Full-pressure lubrication thru drilled passages.
9. Completely sealed to keep oil in and dirt out.
10. Efficient cooling system with thermostatic by-pass control.



Above: Here is International Harvester's small Diesel, the UD-6 (shown equipped for indoor use). This 4-cylinder engine packs a lot of power and is built to stand up under severe operating conditions.

INTERNATIONAL Industrial Power

Shots from the FIRING LINE

Waterway Congress to Discuss Budget Cuts

Drastic discriminatory budget slashes in the amounts recommended for rivers and harbors and flood control projects, far in excess of cuts for other items, and far in excess of the amounts recommended by the War Department, will make the 35th annual convention of the National Rivers and Harbors Congress the greatest in its history, the Congress has predicted on the basis of advanced reservations already received.

Although U. S. Engineers have reported that $73,226,800 could be profitably expended on new river and harbor work during the next fiscal year and $206,624,000 for flood control projects throughout the United States, these recommendations have been reduced more than one-half by the Budget Bureau which requested only $25,000,000 for rivers and harbors and $70,000,000 for flood control.

Commenting on these cuts, the Congress said that it had no quarrel with the President's desire to balance the budget, but that it does object to discriminatory cuts on these natural-resources-conserving projects, particularly in the face of recommendations by the War Department. "The War Department recommended expenditures far exceeding those proposed by the budget," the Congress pointed out. "One of the excuses advanced for the cuts is to provide additional funds for national defense, and who is better qualified to speak on the subject of national defense than the War Department, which requested many millions more than is provided by the budget?"

The Congress said that it has already been swamped with requests for consideration of projects, since the drastic budget cuts were announced, and that more were coming in every day. Similarly, interest of individuals in attending the convention has been tremendously heightened by the decreases, and a record attendance is expected, according to Congress officials.

Reason for the increased interest in the convention lies in the fact that $63,000,000 was slashed by the budget under the amount appropriated last year for flood control, while $26,000,000 was pared from the amount recommended for rivers and harbors work.

The National Rivers and Harbors Congress is composed of senators, congressmen, and leading waterway experts throughout the nation, and is the only nationwide organization devoted to development of waterways. Congressman Dewey Short of Missouri is president.

The Convention of the Congress will be held at the Mayflower Hotel in Washington, March 12-15. The projects committee of the Congress headed by U. S. Senator John E. Miller of Arkansas, will meet on March 12 and 13 to hear oral arguments on projects already presented. Following this meeting, the full Congress will assemble March 14 and 15 for discussion of all phases of the problems presented and to map a course of action.

● **Work on the George P. Kingsley dam at Ogallala, Nebraska, is well under way. The dam is being built for the Central Nebraska Public Power and Irrigation District.**

Propose New Jersey-Penn Tunnel

Belief that work on a vehicular tunnel linking New Jersey and Pennsylvania could begin within a few months, if a requested $15,000,000 RFC loan is granted, has been expressed by William Storrie, secretary of the Gloucester County Tunnel Commission, and Edward D. McLaughlin, chairman of the Delaware County (Pennsylvania) Authority. The proposed tunnel would run under the Delaware River between Thorofare, in Gloucester County, New Jersey, and Hog Island, near Philadelphia.

W. Biddle Saul of Philadelphia, counsel for both commissions, announced that if the RFC loan was granted it would be ample for the entire construction and would be paid off from earnings of the tunnel. The project would ultimately revert to the two states. The War Department, which has approved the plans, is interested in the tunnel for military reasons, Saul said, because a bridge at that point, vulnerable in wartime attacks, might block the Philadelphia Navy Yard if destroyed.

Construction of the four-lane tunnel would give employment to about 3,000 men for two years, it is estimated. A novel method of construction, lowering 200-foot sections of the tunnel into a dredged river bed instead of the customary drilling, has been proposed to save about $10,000,000. A new type of ventilating shed also has been proposed, to offset the objection that high ventilating towers might impair the utility of the adjacent Philadelphia Airport.

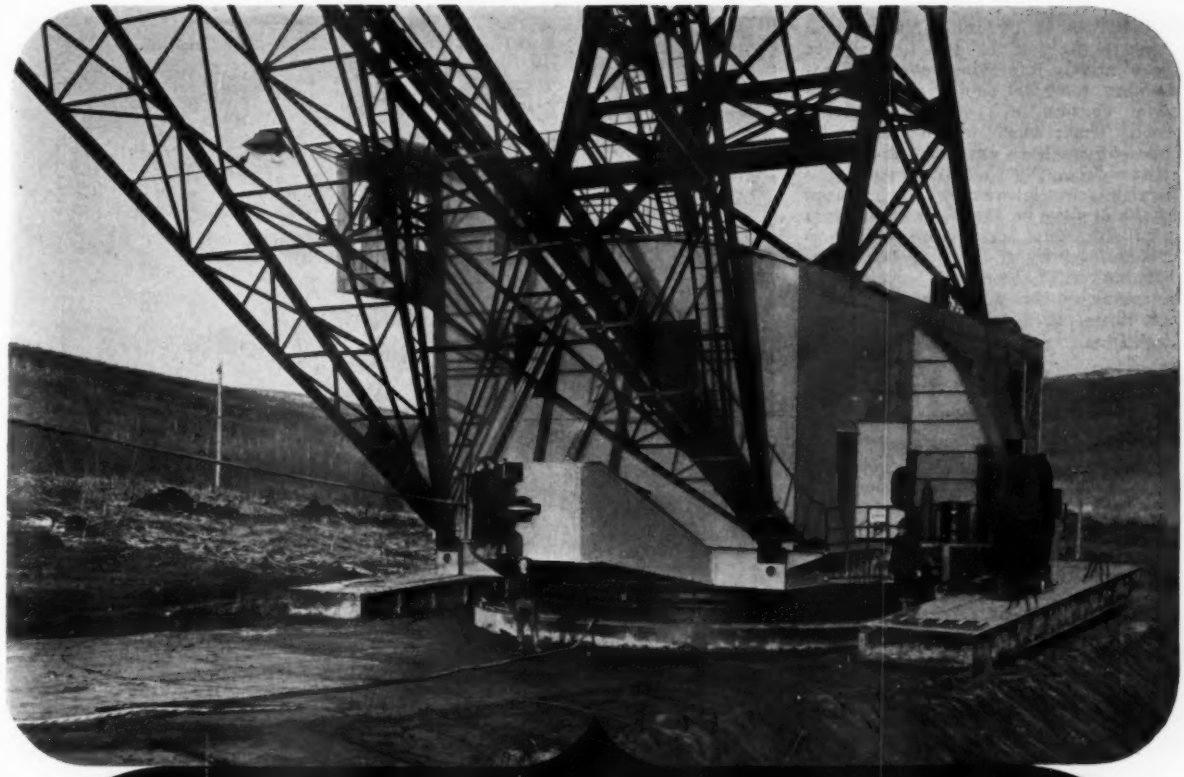
Terteling Low Bidder on Fort Peck Fill

J. A. Terteling and Sons, Boise, Idaho, were the apparent low bidders on construction of the remaining earth fill at Fort Peck Dam according to the first comparison of bids recently opened at the U. S. Engineer Office.

The apparent low bid for moving 1,365,000 cubic yards of earth required to raise the main dam structure to its final grade was $169,456. Morrison Knudsen Company, Inc., Boise, Idaho, was the apparent second low bidder with a price of $223,308, and Frank Mashuda, Milwaukee, Wisconsin, was the apparent third low bidder with a price of $248,865. Twelve contractors entered bids for the work. The Government estimate was $229,650.

Forty-six separate bids were also received on miscellaneous earth-moving equipment owned by the government and located at the dam site. Due to the fact that bids were also entered for this equipment by the contractors who bid on the earth-moving work, further examination of the bids must be made before the status of the bids is definitely known.

The material to be moved includes 66,300 cubic yards of glacial till which



IT CUSHIONS DOWN

Ride the cab of a Bucyrus-Monighan dragline when it's walking. Notice the smooth, sure action that puts the machine where you want it without waste time. Notice how gently the base comes down at the end of each step. There are no jars, bumps or hops to put destructive stresses in the machine. The million-pound walker shown in this picture, cushions down its weight evenly and gently. The exclusive Bucyrus-Monighan Rolling Cam is the reason. With the smoothness possible only to a wheel rolling in a circular rail, the Rolling Cam gives a positive, fully controlled action that distributes over a wide area the forces set up in walking. Simple, field proven, the Bucyrus-Monighan walks as surely and dependably as it digs. It's a dragline that really steps around, and keeps stepping around. You can get it with booms from 60 to 250 feet, with buckets from 2 to 20 yards. Large or small, each one of these draglines walks with a "cushion action" that means worry-free moving.

BUCYRUS MONIGHAN

Sold by

Bucyrus-Erie

G 28

SOUTH MILWAUKEE, WISCONSIN

For your convenience in writing to Bucyrus-Erie Co., you will find a card bound in this issue.

will be placed by rolled-fill methods along the axis of the dam to complete the relatively impervious core. The remaining 1,300,000 cubic yards of material consists of pervious material, mostly sand, which will be placed by rolled-fill methods upstream and downstream from the rolled-fill core. The pervious material was previously placed by the dredges on the faces of the dam outside the final section and in the immediate vicinity of the proposed work. Topping-out of the dam is scheduled to be completed this year. This will be the last large earth-moving work at Fort Peck Dam.

National Forest Highway Funds

Apportionment of $8,666,667 of forest highway funds in 40 states, Puerto Rico and Alaska and $4,333,333 for construction and maintenance of truck trails, and other trails or forest development roads in the national forests of 39 states, Puerto Rico and Alaska were announced recently by the U. S. Department of Agriculture for the fiscal year ending July 1, 1941. The funds will be used to maintain and augment the present systems of approximately 173,000 miles of roads and trails now in the 160 National forests.

The forest highway apportionment for each state is determined by law and is made 50 per cent on the basis of value of National Forest lands in the state and 50 per cent on area of the state's National Forest lands. On this basis, North Dakota receives $32 and Iowa $40 for forest highways while California and Oregon each receive more than a million dollars for forest highways. The law does not require that the sums be matched by the respective states.

In making the forest highway apportionments, the total value on June 30, 1939, of 175,527,511 acres of government lands in the National Forests is given as $1,103,464,881.

● Air view of the new $10,000,000 National Airport under construction at Washington, D. C. Note dredges placing fill.

The $8,666,667 of highway funds will be expended upon federal aid, state and county highways which are a part of the approved forest highway systems of the states, the projects being selected cooperatively by the regional foresters of the U. S. Forest Service, the district engineers of the Public Roads Administration, and by state highway commissions.

At the end of the fiscal year 1939, the U. S. Forest Service reports 8,338 miles of forest highways have been constructed, nearly 7,000 miles representing mountain-side excavation, blasting, tunnelling, filling or similar major undertakings. About 1,350 miles represented roads constructed with minor difficulties. Truck trails comprised 54,752 miles and other trails 110,578 miles of the forest transportation system.

IRBA Endorses Federal Loans

Forty-year federal loans to enable local governments to acquire rights-of-way needed for superhighway construction were endorsed by the Illinois Road Builders Association in its third annual meeting held recently.

The road builders called on the Illinois congressional delegates to support Title 2 of House Bill No. 7695 and Senate Bill No. 3020, on which hearings are currently being held.

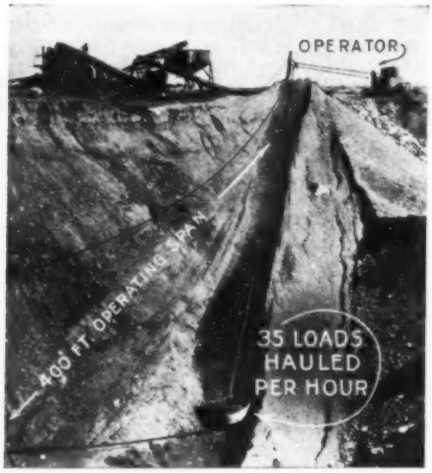
The measures would provide for RFC funds to be made available to the Public Roads Administration for acquiring rights-of-way and for making loans to local governmental units to acquire land needed for construction, reconstruction, or improvement of public roads.

Such loans, plus interest, would be repaid within 40 years.

Road builders described such action

SAUERMAN LONG RANGE MACHINES

DIG, HAUL & DUMP FOR A FEW CENTS PER YARD



AMAZING EFFICIENCY—The Sauerman Power Scraper is the most popular machine for gravel excavation and general dirtmoving. The above picture shows why. Note the simplicity of the operation. One man does everything. Fifty cents an hour covers the fuel cost. The streamlined Crescent bucket digs a heaping load quickly in any class of material and hauls the load at high speed with a minimum of friction.

Use a Sauerman machine to reduce your equipment cost and operating expense on such work as the following:

—making long cuts and fills
—canal and levee construction
—cleaning reservoirs
—digging gravel from rivers, hills and pits
—stockpiling and reclaiming gravel, coal, ore, etc.
—and other long haul work.

A Sauerman machine has a great advantage over other types of equipment on work such as listed above because it is able to reach any distance up to 1,500 ft. and dig, haul and place the materials in one operation.

For a complete explanation of the savings you can make by using Sauerman machines, write for our 84-page catalog.

SAUERMAN BROS., Inc.
474 S. Clinton St., Chicago

For your convenience in writing to Sauerman Bros., Inc., you will find a card bound in this issue.

as imperative if cities, counties, and states are to hope for any solution of present congested traffic conditions.

Its results would be immediately apparent in such metropolitan areas as Chicago, where the need to acquire expensive rights-of-way has for years prevented any real effort to build fast, safe express routes of a superhighway nature. Rights-of-way frequently total 50 to 75 per cent of the entire estimated costs of superhighways in urban centers.

These Congressional measures also would permit the public roads administration to acquire parkway rights along federal routes and so control roadside development which follows opening of interregional express routes.

"Such legislation is of a 'must' nature if our highways are to be developed to serve the social and economic demands of motorists," according to Herbert R. Anderson, president of the Illinois group and a vice-president of the American Road Builders.

"It is one of the fairest plans yet devised for federal assistance in needed public improvements. There is absolutely no risk for the federal treasury. The loans, plus interest, will be repaid out of highway-user-taxes. If, in some instance, a local government was unable to make such repayment, the government still would hold title to rights-of-way which will grow increasingly valuable through the natural increment in realty values.

"Financing of right-of-way purchase is even more sound than the federal government's road construction. After all, the highway surface may wear out in 30 years, but the rights-of-way will remain useful and practical for centuries."

The Illinois road builders also urged favorable congressional action on inclusion of highway construction in national defense plans and asked that any such building be carried on through the public roads administration and state highway departments for best results.

A third resolution recognized increasing demands in Illinois and elsewhere for all-weather surfacing on farm-to-market, rural post, consolidated school bus, and other essential secondary road routes.

The road builders asked that the annual appropriation for the federal aid secondary system be increased to fifty million dollars with at least half to go to routes not now included in the federal secondary system, utilizing standards of construction in keeping with the needs of localities to be served. Rural criticism has recently been voiced at unflexible standards maintained for all secondary roads, pushing costs above practical needs in some sections. A secondary clause urged that such funds be handled through cooperation of federal and state road building authorities to promote "greater efficiency" in local units.

Herbert R. Anderson of Chicago (Robert R. Anderson Company) was re-elected to his third term as president. New men will fill the other three offices: Vice president, Peter J. Trompeter (Trompeter Construction Company), Peru, Illinois; secretary, Donald O. White (White Consolidated, Inc.), Chicago, Illinois; treasurer, Henry Fowler (John A. McGarry & Company), Chicago.

New directors are: James F. Gallagher (Gallagher Asphalt Company), Thornton, Illinois; and Joseph A. Gund (Gund-Graham Company, Freeport, Illinois.

Re-elected directors are: William A. Hasse (Independent Paving Company), Calumet City, Illinois; A. B. McDonald, Waukegan, Illinois; M. P. O'Connor (O'Connor Construction Company), Springfield, Illinois; and George Welch, Dundee, Illinois.

Taylor G. Soper of Chicago was re-elected executive secretary.

AMC Elects Officials

Howard I. Young, president of the American Zinc, Lead & Smelting Company, was elected president of the American Mining Congress at its recent 42nd annual meeting at the Waldorf-Astoria Hotel, New York City. Others named were: vice presidents, D. D. Moffat, vice president of the Utah Copper Company; Donald A. Callahan of Wallace, Idaho; E. B. Greene, president of the Cleveland-Cliffs Iron Company, Cleveland; secretary, Julian D. Conover

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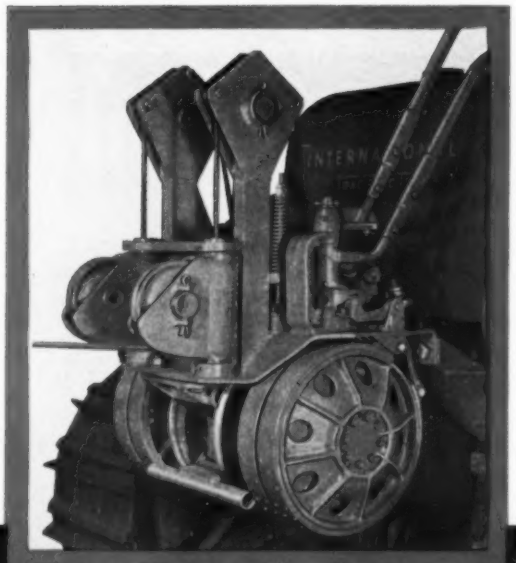
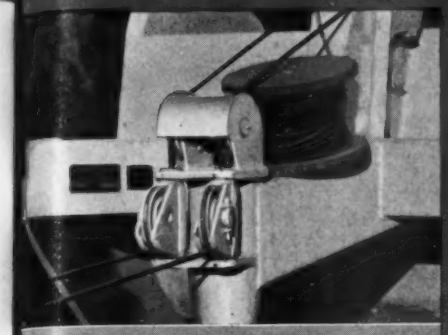
BUCYRUS-ERIE announces a new line of 4-wheel scrapers offered in a complete range of sizes for use with the new International TracTracTors. You'll find in these new dirt-moving units everything you've always wanted in a scraper. They have: *2-line cable control*—to provide for control of depth of spread; *double curve cutting edges*—to produce easy loading; *low center of gravity*—to provide stability for digging and unloading on side slopes; *constant wheelbase*—for proper flotation in digging, dumping, and hauling; *positive rolling ejection*—so that you can dump *any* kind of material. They have only *five* moving elements and are the simplest dirt moving units you can buy. Created and designed by the largest and most experienced staff of dirt-moving engineers in the world, the new Bucyrus-Erie Scrapers are simplicity personified . . . but they have everything. Find out all about them from your International TracTracTor Dealer.



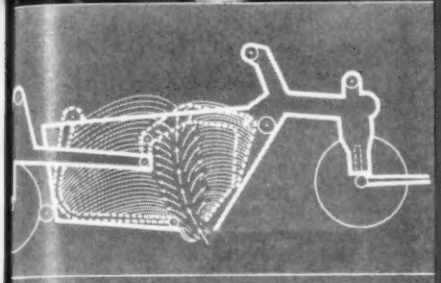
New Bucyrus-Erie planetary type Power Control Units for use with the new Bucyrus-Erie Scrapers. Available in double and single-drum models, they can be used wherever cable control-units are required.

Scrapers *have everything!*



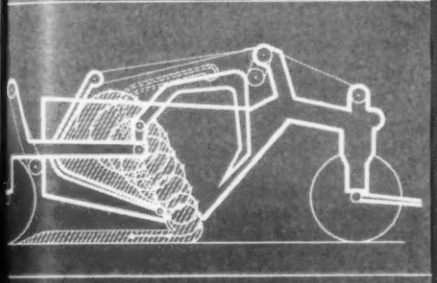
Two-line cable control with free-swinging fairlead sheaves.

Cable is free of twisting bends, all sheaves are in a vertical plane.

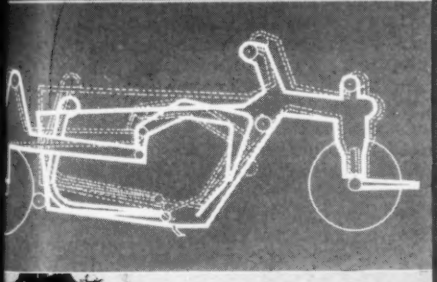


Double curve cutting edge produces *boiling* action which loads both apron and bowl at the same time.

Stability permits digging and dumping along a slope.



Positive rolling ejection . . . controlled depth of spread.



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of Washington, D. C.; directors, Arthur E. Bendelari of the Eagle Picher Lead Company, Cincinnati; Charles H. Segerstrom, president of the Nevada-Massachusetts Company, Sonora, California; Harry LeRoy Pierce of the M. A. Hanna Company, Cleveland; J. B. Warriner, president of the Lehigh Navigation Coal Company, Philadelphia; and D. D. Moffat, vice president of the Utah Copper Company.

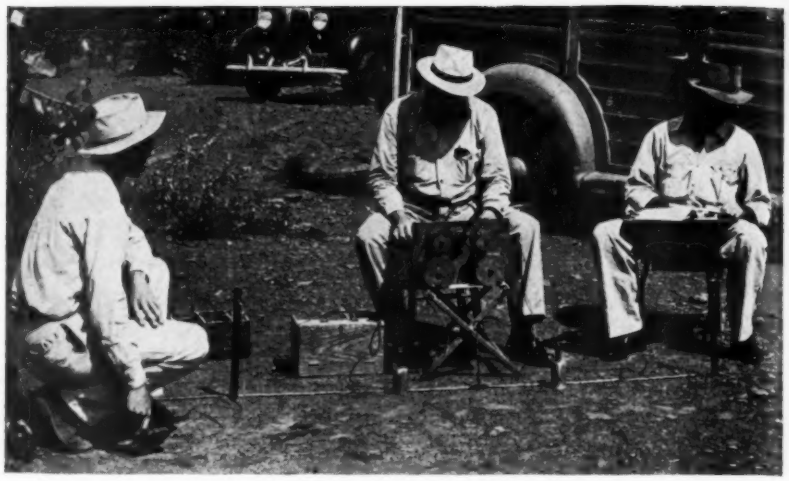
A resolution adopted by the group strongly opposed the proposed St. Lawrence waterway project, which it described as "needless and unjustifiable."

N. Y. Engineers to Meet

The fifth annual convention of the New York State Association of Highway Engineers will be held in Rochester, New York, on March 28, 29 and 30, 1940.

Hotel Seneca will be the convention headquarters with business sessions opening on the afternoon of March 28, the morning being given over to registration and demonstration. At night the annual banquet of the Association will be held with business sessions continuing all day Friday and an entertainment at night. Saturday afternoon there will be trips to various points of interest around Rochester.

Howard E. Smith, district engineer of New York State highway district number four, is honorary chairman of the convention and the following executive committee are now working to make the convention successful: G. W. Ryan, F. C. Facer, P. L. Ryan, J. P. Larson, and P. H. Wright.



● **Texas state highway department employees operate the highly sensitive resistivity device in search of much needed deposits of road building material.**

Texas Searches for Hidden Gravel

An electric resistivity device is being employed with marked success in the discovery of valuable road-building materials in Texas, where a state-wide survey of mineral resources is being conducted by the University of Texas, with the assistance and cooperation of the Work Projects Administration and the State Highway Department.

A sensitive instrument which reacts to the presence of gravel deposits, the resistivity device is operated by field crews in various countries and is followed by other field parties which verify its findings.

The new device has already proved its value in Van Zandt County which lies along the western limit of the main portion of the East Texas timber belt. Most of its roads are of dirt construction and become practically impassable in rainy weather. With no known deposits of road building material available, county commissioners were faced with the difficult problem of roads sadly in need of repair and the prospect of long and expensive hauling of materials in order to do the needed work. Since the WPA mineral resources survey began operating in Van Zandt County, working in conjunction with the State Highway Department and the county commissioners, useful deposits of rock and gravel have been found in 110 localities. Highly silicious and crystalline in character, the newly-discovered gravel is expected to supply the country's road building needs for many years.

Also discovered by the survey were a large number of previously unknown deposits of hard ferruginous sandstone which not only makes excellent road base but produces beautiful and durable building stone, ranging in color from rich reds to chocolate with intermediate shades of pink, brown, tan and sienna. Future generations of Van Zandt County builders will have access to beds of valuable brick and pottery clay and out-croppings of lignite located by the survey.

WPA has allotted $384,480 for the operation of the statewide mineral resources survey which has been completed in 64 of the 254 Texas counties to date. Supervision has been provided by the sponsoring University of Texas

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bureau of economic geology, under the direction of Dr. E. H. Sellards. The electric resistivity apparatus was first used in connection with the WPA survey by the Texas highway department in November 1937, and has been employed with continuing success since that time.

Government officials recently reported that among the findings of the survey have been the mapping in commercial quantities of such mineral deposits as green sand or glauconite which is rich in potash, bleaching clays, filter clays, volcanic ash, gypsum, and extensive oil shales which may later supply petroleum when our present supply is exhausted. In addition, the location of more than sixty million cubic yards of building and road gravel and more than one and one-half million cubic yards of caliche for road building have been reported.

New York Favors Tunnel

Strong support for construction of the proposed tunnel under the East River between the Battery, Manhattan, and Hamilton avenue, Brooklyn, has been expressed by the New York Regional Plan Association, which previously was one of the leading organizations to oppose a proposed bridge between the two points. The bridge project was abandoned some time ago.

In a resolution adopted recently the plan association reiterated its policy that all future river crossings connecting with southern Manhattan should be by tunnels instead of bridges, claiming that bridges are unsound from a planning point of view, and urged further study of the entire problem by providing additional traffic facilities across the river.

AIMME Convention Talks

The United States is awakening just in time from its dream of plenty and its concept of abundance and is developing a National program for study of the invaluable metals in which it is deficient, D. F. Hewett, of the Geological Survey, told scientists of the American Institute of Mining and Metallurgical Engineers meeting in New York last month.

A nation accustomed to abundance in many things does not readily concede to the idea of scarcity in some, yet certain definite metal deficiencies in the United States are so pronounced as to be obvious to all, Mr. Hewett asserted. Particularly is this true of various strategic metals: tin, nickel, chromium, manganese, tungsten, mercury, antimony and aluminum.

We consume half the world's supply of tin, but produce far less than one per cent of its needs, Mr. Hewett revealed. We also consume 40 per cent of the world's supply of nickel, but produce only one-half of one per cent of the consumption. In some parts of the world, single bodies of chromite have yielded several hundred thousand tons of ore, but the largest production from a single deposit in the United States was about 16,000 tons, and several hundred deposits were regarded as exhausted after yielding a few hundred tons or less.

Mr. Hewett not only reminded the scientists of the nation's deficiencies, which he said cannot be rectified "without benefit of the geologic clergy," but cautioned them against considering even the abundant metals inexhaustible. He said that in the production of metals the United States is conforming rather closely to a cycle that has been experienced by many other countries, with gold production first attaining the zenith, to be followed by peaks in production of silver, copper, lead, zinc, and iron. The idea of mineral abundance in this country developed with the extraordinary production of iron and copper in the Lake Superior region and of gold, silver, copper, lead and zinc in the western states from 1890 to 1915. A careful review of Europe during the 19th century, or of our own Atlantic Seaboard, will dispel any illusions this country may have of mineral inexhaustibility, he said.

Twelve other geologists of the Geological Survey described various phases of that agency's recent investigations of domestic deposits of strategic metals, for which Congress last year made appropriations to the Geological Survey and the Bureau of Mines. Alaska's part in the program was discussed by John C. Reed. Manganese deposits at Phillipsburg, Montana, were described by E. N. Goddard; those in the Olympic Mountains, Washington, by C. F. Park, Jr.; those in the Little Florida Mountains, New Mexico, by S. G. Lasky.

Domestic deposits of chromium in the Stillwater region, Montana, in the Strawberry Range, Oregon, and in southwestern Oregon and northern California, were described by J. W. Peoples, T. P. Thayer, and F. G. Wells.

Tungsten deposits in Nevada were discussed by Ward Smith, and those in Boulder County, Colorado, by T. S. Lovering.

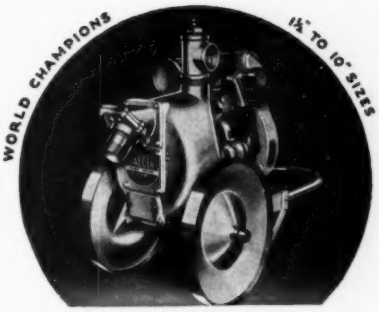
Quicksilver deposits at Bottle Creek, Nevada, were described by R. J. Roberts, and those of the Mt. Diablo District, California, by C. P. Ross.

Carl Fries spoke on the tin deposits of Catron County, New Mexico.

Resume Delaware River Dredging Operations

Government and contract dredges have been undergoing repairs and painting in preparation for resumption of work on the 40-foot channel in the Delaware River authorized in the 1938 River and Harbor Act.

The 40-foot channel, upon which work was started last October, will extend from deep water in Delaware Bay to the Philadelphia Navy Yard. A depth of 37 feet will be dredged from the Navy Yard to Camden bridge. Width of the channel will be 1,000 feet in the Camden-Philadelphia harbor area, 1,200 feet at Bulkhead Bar and 1,000 feet at the other bends. The width



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will be 800 feet in straight reach to a point near Ship John Light and thence 1,000 feet to Delaware Bay.

Estimated cost of the new project totals $11,000,000 with $1,700,000 to be spent annually for maintenance. Philadelphia and Camden authorities are required to cooperate in maintenance to the extent of removing annually from the channel an amount equal to the actual solids in untreated sewage discharged from their respective sewage systems into the Delaware River. This cooperation will not be required after completion of sewage treatment works. A recent survey determined that these sewage deposits amounted annually to about 100,000 cubic yards from Philadelphia and 10,000 cubic yards from Camden.

Delaware River improvement during the last quarter century, according to recently announced figures, has included removal of 300,000,000 cubic yards of mud and sand and 1,200,000 cubic yards of rock. Bulk of recent work was done by private concerns under contract, although maintenance dredging, amounting to about 10,000,000 cubic yards annually, has been done almost exclusively with a plant owned and operate by the government.

In addition to the American Dredging Company, others engaged in recent Delaware River improvement are listed as including Edward H. Ellis, Inc., Burkett Construction Company, Richards-Kelly Company, Continental Dredging Company, Atlantic Gulf and Pacific Company, Arundel Corporation, and Standard Dredging Corporation.

Railroads Expect Increase

Railroad freight car loadings of gravel, sand and stone are expected to increase 10.2 per cent throughout the nation during the first quarter of the current year over the corresponding 1939 period, according to estimates compiled by the 13 regional shippers' advisory boards and made public by the Association of American Railroads.

The estimates indicate that freight car loadings of gravel, sand and stone will total 178,299 during the first quarter this year, as compared with 161,787 actual carloadings in the same period last year.

During the same period the carloadings of brick and clay products are expected to increase 7.4 per cent, from 48,305 carloadings in the first quarter last year to an estimated 51,877 in the first three months of this year.

Cement carloadings are expected to reach 88,971, an increase of 6.4 per cent over the 83,652 actual carloadings in the first 1939 quarter.

The complete estimates, covering 29 principal commodities, indicate a 12.1 per cent increase during the first quarter, with total carloadings reaching 5,123,227, as compared with 4,570,472 for the first quarter last year.

New York's Road Budget

Including the cost of completing contracts already awarded or to be let, a total of $58,000,000 will be available for highway construction, reconstruction and maintenance in New York State before June 30, 1941, Governor Herbert H. Lehman declared in his recent annual budget message to the State Legislature at Albany. In addition, he pointed out, there will be available for grade crossing elimination more than $78,000,000, for which appropriations already have been made.

Under Governor Lehman's budget recommendations for the 1940-41 fiscal year, however, less than 25 per cent of an estimated $102,000,000 in motor vehicle and motor fuel tax revenues are allotted to highway construction and maintenance. The recommendations include $17,000,000 for state highway construction and repair; $5,140,000 state aid for county and town highways, and $550,000 state aid for snow removal.

In addition to the $23,424,000 total, included in his proposed budget, the governor estimated there will be $8,299,635 federal funds available for roads and grade crossing elimination during

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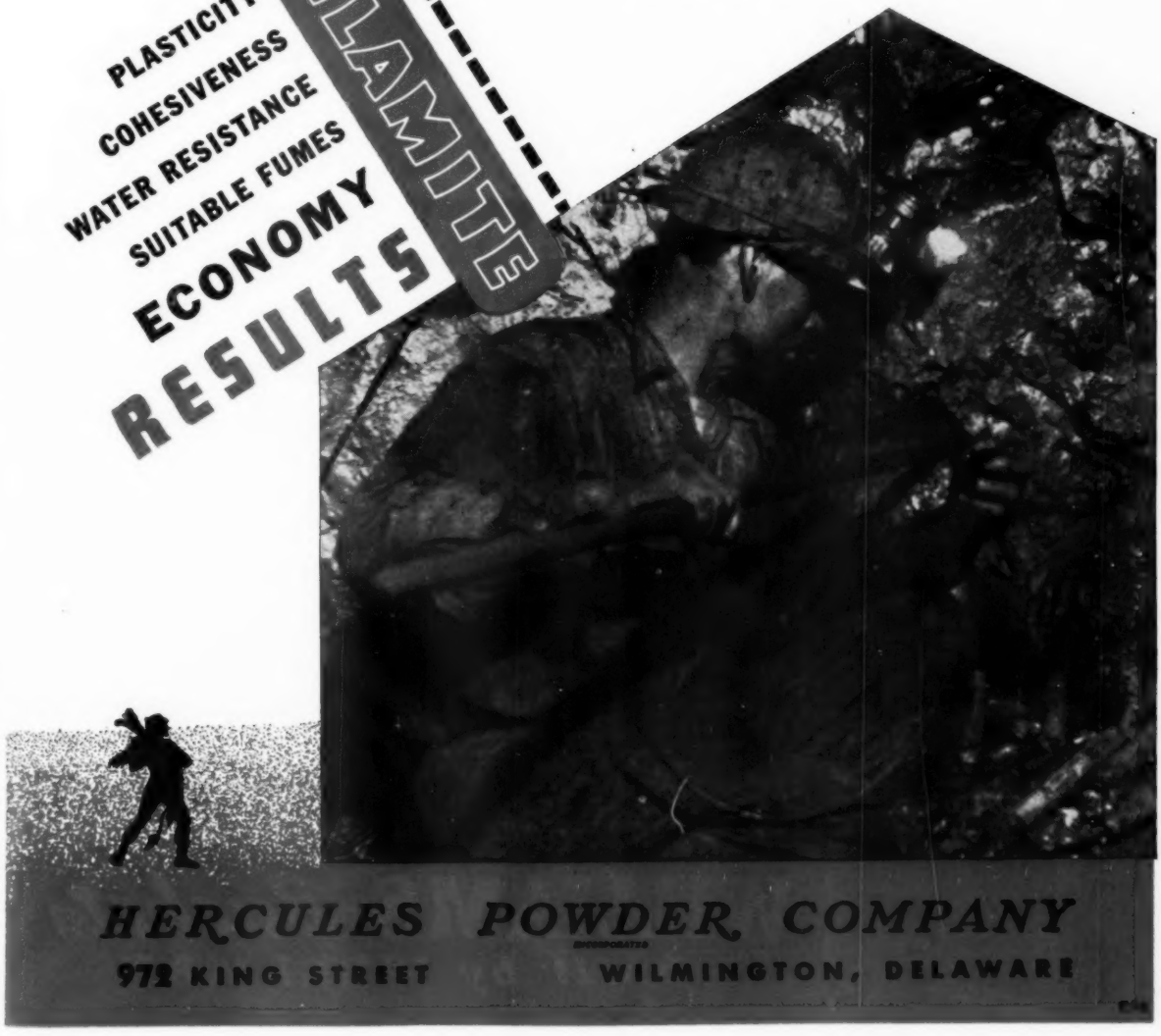

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● Guthrie-Marsch-Peterson's Bucyrus-Erie electric tunnel shovel loads out muck in the east heading of Pennsylvania Turnpike's Allegheny tunnel.

the coming fiscal year, and that $26,294,225 remains available for roads from previous state appropriations and federal grants. These sums are set aside from the $78,000,000 previously authorized for grade crossing elimination work under a program launched last year.

Governor Lehman's recommended expenditures for all purposes totaled $396,707,000. To support this "economy budget" and to overcome an accumulated state deficit of $32,871,000, he recommended revision of the state's personal income tax to yield an additional $15,000,000 and also called for extension of all existing so-called "emergency" taxes, including the third and fourth cent of the state's 4-cent gasoline tax rate.

Motor fuel taxes will produce $63,500,000 during the coming fiscal year in New York State, the governor anticipates, an increase of $1,000,000 over estimated receipts from this source during the current fiscal year. Another $1,000,000 gain is anticipated in motor vehicle tax revenues, which are estimated for the coming fiscal year at $38,500,000.

Governor Lehman said his budget "includes only the minimum necessary appropriations" and cited highways as one instance where he felt more money should be spent. He declared: "We should spend more rather than less on our highways and parkways. We should expand our campaign for safety on the highways." Despite these assertions, however, the governor's budget proposed diversion of more than 75 per cent of highway users' tax contributions to other than road construction and maintenance purposes during the coming fiscal year.

Congress Launches Small Dam Program

The recent appropriation by congress of $500,000 for small dam construction, under supervision of the United States Reclamation Bureau will permit the construction of nearly 276 proposed small dam projects in various states,

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ranging in cost from $5,000 to $50,000.

A separate staff of well-qualified engineers and dam experts will be set up, as soon as complete lists have been presented of proposed projects, to plan, negotiate repayment contracts for and to construct these small projects. This will reduce to an absolute minimum the overhead. The initial appropriation of a half million dollars will not go very far toward filling the need for such projects that exist, but the program so far outlined will serve principally as a demonstration in this new field of reclamation work.

A program has already been worked out for the Great Plains and construction is beginning on several projects in that area.

The qualification standards are designed to measure the responsibility of contractors bidding on highway construction. They have been recommended to avoid the difficulty and expense to contractors of maintaining financial records to comply with the varying requirements of the states, and to permit greater freedom in the exchange of information between the states. They are based on the belief that the responsibility of contractors does not change substantially from state to state, and that there should be reciprocity between states in the qualification of contractors.

These standards also define the liquid assets of contractors, and the current liabilities. Upon the difference, or net liquid assets, is based the amount of work contractors are qualified to undertake. Experience is also taken into account.

For more than two years of highway contracting experience, contractors will be qualified to undertake work equal to five times net liquid assets. Premium ratings based upon experience and past performances may increase the amount to eight times net liquid assets.

The joint committee, which includes a representative of the Public Roads Administration, has been in existence more than three years. In August it agreed upon a tentative set of standards and sent copies and questionnaires to contractors and state highway departments for comment.

Of 36 state highway departments replying, 30 were entirely favorable or suggested further consideration of certain details. Three suggested extensive changes, three were noncommital, and none expressed specific disapproval.

Of replies from contractors, chiefly from local chapters of the Associated General Contractors, 24 expressed entire approval or suggested certain modifications, none were more or less noncommital, and two expressed definite opposition.

Philadelphia's New Airport

Construction of Philadelphia's new municipal airport, in which modern earth moving methods played a major role, is scheduled for completion May

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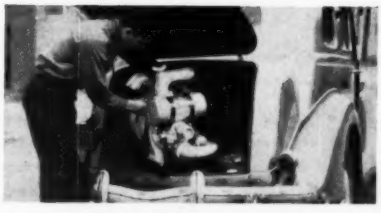

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15. John H. Neeson, who recently became city public works director, has been chief engineer in charge of the project which started nearly four years ago and has cost approximately $11,000,000, exclusive of the cost of land. Located on Hog Island, Southwest Philadelphia, it will be named the S. Davis Wilson Airport, in honor of the city's late mayor who inaugurated the project to fulfill his dream of "an airport second to none."

One of the greatest tasks in development of the airport was to raise it above the level of the Schuylkill River. Fill to a depth of eight and nine feet was required in the majority of places to bring the field to a point two feet five inches above the mean high water level of the river.

This work was accomplished by WPA workers, of whom at one time there were 3,600 working in two shifts. When they finished they had moved 1,500,000 cubic yards of earth to the site and had pumped 500,000 cubic yards from the Schuylkill.

The WPA force withdrew from the work in December, 1938, and it was continued by city employes. On completion, according to reports on progress of the project, there will have been dumped 3,250,000 cubic yards of dirt to insure against flooding of the field.

The construction also called for laying of 22.2 mile network of drains, 9.2 miles of conduits to drain storm water from the runways, seven miles of surface water inlets and 20 miles of underground cables for transmission of radio and electric light power.

Of the project's approximate $11,000,000 cost, $7,000,000 has been advanced by WPA largely for wages. Philadelphia's construction share has amounted to $4,000,000.

A section of the Leschen Laboratory where wire is being tested to determine its fitness. In this department are many other instruments, among which is an 800,000 pound capacity machine for determining the actual breaking strength of completed wire ropes.

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OBITUARY

B. E. Brooks

B. E. Brooks, widely known Mississippi levee constructor, died unexpectedly January 22 at his home in Atlanta, Georgia, at the age of 56.

Mr. Brooks, who began his business career at the age of 14 with a high school education and a team of mules, was the president of the Brooks-Calloway Company of Memphis, one of the south's largest contracting firms.

Under the guidance of Mr. Brooks, the firm has been employed by the federal government in the all-important work of keeping the Mississippi river within its banks. As specialists in levee construction work since 1929, the firm has undertaken some of the largest flood control projects ever attempted in Louisiana, Arkansas, Tennessee, and Mississippi.

The guiding spirit behind the company's development was Mr. Brooks, who, 42 years ago, determined to follow in the footsteps of his father, J. M. Brooks, one of Georgia's first contractors.

Graduating at the age of 14 from the Molena, Georgia, high school, the youthful Mr. Brooks acquired two mules, a scraper, and went to work on his first job as his own boss—grading a section of the Central of Georgia railroad between Atlanta and Macon.

In a very few years he had moved to Atlanta and his activities steadily expanded. Mr. Brooks handled other railroad excavation and grading work, not only in Georgia, but in virtually every part of the south.

Specialization in levee construction work followed this, and Mr. Brooks' company, now located in Memphis, has been engaged in this line almost continuously for 10 years. The manner in which he carried out the projects, meeting the strictest requirements of the government engineers, led from contract to contract and today there are miles and miles of barricades along the banks of the Mississippi which were constructed under his direction.

One of Mr. Brooks' largest projects required machinery and equipment valued at more than $500,000. Recently his firm finished two levee jobs near Memphis.

Mr. Brooks was a Shriner and a member of the Baptist church.

Surviving are his wife; a daughter, Mrs. Sam H. Rumph; a son, B. E. Brooks, Jr.; a sister, Mrs. Zack Lawrence, Jr.; a brother, J. L. Brooks; and a granddaughter, Juliana Rumph.

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Trade notes

Hercules Motors Corporation of Canton, Ohio, has built up an efficient distributor organization for the sale and installation of its diesel replacement unit for the Ford truck chassis. All Ford dealers are now in position to supply the Hercules diesel. Hercules distributors have been established principally in Ford Motor Company branch cities —where engines are installed and where parts and equipment are quickly available for servicing the engines. Twenty-two of the thirty-four Ford branch cities in the United States now have Hercules distributor representation.

In observance of their golden anniversary, The West Companies of Chattanooga, Tennessee, published a four page brochure in which it graphically described the history of the company and its officials.

The West Companies were described as "all boy-to-man organizations" with pictures and brief biographies of their officers featured. Illustration of advancements made in their line of equipment also figured prominently.

Announcement by W. H. Schomburg, Executive Vice-President of The Buckeye Traction Ditcher Company, Findlay, Ohio, places Paul B. Cochran in charge of sales.

Mr. Cochran is widely known in the construction equipment industry from his many years of active sales work, especially during recent years as sales manager of the R. B. Equipment Division of Buckeye while that office was in Chicago.

The new appointment places Cochran in charge of sales of all Buckeye equipment and brings his headquarters to the general office in Findlay, Ohio.

Harry L. Vines, former Supervisor of Special Representatives for the Western Division of Caterpillar Tractor Company, has accepted a position of Western Sales Manager for R. G. LeTourneau, Inc., world's largest manufacturer of heavy grading equipment, filling a position vacated by John R. Bryan who was appointed Chief Western Field Engineer.

In another change, Mr. Bryan has been appointed Chief Field Engineer for the West Coast. He will continue to make Stockton his headquarters and assist Western dealers and contractors by the compilation of helpful engineering data.

Edward D. Emerson, since 1937 District Sales Manager with Babcock & Wilcox Tube Company, New York City, has been appointed General Manager of Sales for John A. Roebling's Sons Company, Trenton, New Jersey.

Mr. Emerson is a graduate in Mechanical Engineering, Harvard University, class of 1927. Previous to his employment with Babcock & Wilcox he was for several years Sales Engineer with the Jones & Laughlin Steel Corporation.

Mr. Emerson assumed his new duties March 1.

Book reviews

Written from a practical, engineering point of view, the McGraw-Hill Book Company's latest publication, Geology and Engineering, by Robert F. Legget, presents a review of the application of the science of geology to the whole field of civil engineering. Its three parts present an outline of the science and methods of geology, detailed explanation of geological applications in improving the planning and construction of all types of civil engineering structures, and useful reference material. So far as possible, every point mentioned is illustrated from modern practice, drawn from world-wide sources. The price of the manual is $4.50.

Construction Machinery Company, Waterloo, Iowa, have recently released their new catalog giving contractors a complete descriptive picture of new and outstanding equipment developed by the CMC organization.

It contains a descriptive analysis of the renewable drum liners for the new CMC mixer line from 5S Models up, of the new 3½ Non-Tilt Mixer and of another addition to the CMC Line, the revolutionary Bin Batcher.

In the CMC pump line, new items described, include a triple prime well-point pump as well as a 2-stage self-primer. Two new models of saw rigs—Kost Kutter Sr. and Jr. are also featured. The well known line of plaster, mortar and bituminous mixers has been augmented with new models and features according to CMC.

This catalog is available by writing Construction Machinery, Waterloo, Iowa, or on the West Coast to 206 South Spring Street, Los Angeles, California.

The International Textbook Company of Scranton, Pennsylvania, has recently published a very interesting book termed, "Elementary Surveying," by Warren C. Taylor, Assistant Professor of Civil Engineering, Union College. The purpose of Taylor's Elementary Surveying is to provide a text for the short course in surveying usually given to engineering freshmen. The 17 chapters of the textbook have been made concise—without sacrificing the essentials necessary for a complete understanding of the subject. The price is $2.00. For further information write to the International Textbook Company, Scranton, Pennsylvania.

The South Bend Lathe Works, South Bend, Indiana has just issued a new catalog which is said to be the most complete lathe catalog ever published. This catalog contains 112 pages with over 250 illustrations and shows 75 different sizes and types of South Bend Back-Geared Screw Cutting Lathes for production manufacturing, tool room and general shop work. A copy of this conveniently indexed catalog will be mailed on request to any individual or firm mentioning this magazine.

Sizes of lathes illustrated are 9", 11", 13", 14½", 16" and 16-24" swing. Each size is shown in several different models with motor drive and countershaft drive. New items shown for the first

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time in this catalog include a 1" Collet Capacity Precision Bench Lathe mounted on a welded steel bench, and a complete line of 14¼" Swing Lathes.

Latest in the dollar publications of the American Institute for Economic Research is, "What Will Social Security Mean to You?" The booklet contains six parts, namely: I. What Will Social Security Mean to You? II. Social Security vs. Your Insurance and Annuity Plans. III. Unemployment Insurance. IV. Public Health and Assistance. V. From the Business Point of View. VI. The Future of the Social Security Act. For your copy send $1.00 to American Institute of Economic Research, 54 Dunster Street, Harvard Square, Cambridge, Massachusetts.

A copy of the new catalog featuring and describing Diamond Jaw Crushers, manufactured in sizes ranging from 9 x 16 to 15 x 36 inches can be had by writing to Diamond Iron Works, Inc. and Mahr Manufacturing Company Div.

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BUCYRUS-ERIE GA-2 Gas-Air 1¼-yd. extra high lift shovel. Waukesha engine. Excellent condition. Located northwestern Pennsylvania. Box 2464

BUCYRUS-ERIE 43-B Diesel 1¾-yd. Shovel and 50' boom Dragline. Buda 6 cylinder 6½"x8¾" engine. 33" cat treads. 1½ KW Kohler light plant. Said to be in excellent condition throughout. Located Texas. Box 2466

BUCYRUS-ERIE B-2 1 yd. steam shovel. Operating condition. Located vicinity Detroit. Box 2308

P&H MODEL 700-B. 1½-yd. Gasoline shovel. Waukesha engine. Good condition. Located Connecticut. Box 2492

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BUCYRUS-ERIE GA-3 Gas-Air 1¼-yd. shovel. Waukesha 4-cylinder 6¾"x8" engine. Good operating condition. Now operating Arizona. Box 2470

AUSTIN MODEL "MA"—Gasoline Dragline—37' Boom—¾ yd. Page "M" drag bucket. Good operating condition. Located western Nebraska. Box 2471

BUCYRUS-ERIE 1020 Gasoline 35' boom Clamshell and Dragline. Located San Francisco. Box 2407

BUCYRUS-ERIE 55-B High Lift Diesel Shovel. 2¼-yd. all welded dipper. 1½ KW Kohler light plant. Atlas engine. Extensively field repaired. First class operating and mechanical condition. Located near Pittsburgh, Pa. Box 2434

BUCYRUS-ERIE 32-B 1-yd. Chain crowd shovel. Electric starter. Wisconsin M-3 6-cylinder 5"x6" engine. Extensively field reconditioned. Located Boston. Box 2486

BUCYRUS-ERIE GA-2 Gas-Air high lift shovel. 24' boom. 18'4" dipper handle. 1¼ yd. dipper. Waukesha 6¼"x8" 4 cylinder engine. Electric starter. Quantity spare parts included. Excellent condition. Located Eastern Pennsylvania. Box 2313

MARION MODEL 381 2 yd. shovel powered by Hesselman engine. Extensively repaired. Excellent condition. Available for demonstration. Located northwestern Pennsylvania. Box 2304

P&H MODEL 400—Combination ¾-yd. gasoline shovel and crane. Crane boom 35' plus 10' extension. Waukesha 4-cylinder 5"x6¼" engine. Located vicinity Boston. Box 2334

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NORTHWEST-6—1½ yd. Shovel. Twin City Oil Engine. Operating condition. Located California. Box 2482

KOEHRING MODEL 501 gasoline 1¼ yd. shovel. Wisconsin 6 cylinder 6"x7" engine. Electric starter. Extensively repaired. Good operating condition. Located Texas. Box 2302

LORAIN UNIVERSAL MODEL 35—Dragline—28' boom. Waukesha 4½"x6" engine. Recently overhauled. Fine condition. Located California. Box 2290

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NORTHWEST-25-¾-yd. Rope crowd shovel. Battery lights in cab. Wisconsin 4¼"x6" 6-cylinder engine. Very good condition. Located Iowa. Box 2485

MARION MODEL 7, 1-yard steam shovel. Has not operated in the past five years. New flues recently installed in boiler. Located Buffalo, New York. Box 2460

KOEHRING MODEL 1-A. Combination 40' boom crane and dragline. Gasoline. Wisconsin engine. Operating condition. Located near St. Louis. Box 2402

LINK-BELT, MODEL K-2, Gas crane. 50' boom. Also 2 extra 20' inserts to make 90'. Weight 67,000 lbs. Located St. Paul, Minn. Box 2462

BUCYRUS-ERIE, GA-2, Gas-Air. 1¼-yard shovel. Electric starter. Waukesha W.L. 4-cylinder 6¼"x8" engine. Single shaft cat. Extensively repaired recently. Located Texas. Box 2463

P&H MODEL 150 ½-yard gas shovel. First class operating and mechanical condition. Can be demonstrated. Located western Pennsylvania. Box 2400

BUCYRUS-ERIE 50-B Diesel Dragline Kohler Light Plant. Worked less than half the time since sold new. Good condition. Located Illinois. Box 2476

SPEEDER ½ yd. Gas shovel and 35' boom dragline. Good condition. Ready to go to work. Located Southern Michigan. Box 2489

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BUCYRUS-ERIE—Class 24 steam dragline. 100 foot boom, 5 cubic yard bucket. Skid and roller mounted. Rebuilt 1927 at a cost of $15,000. New locomotive boiler installed 1928. Will accept any fair offer. Located near Fort Worth, Texas. Box 2491

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BUCYRUS-MONIGHAN 1½-T Diesel Dragline. 70' Boom. Located Kansas. Box 2455

PAGE—MODEL 220—2½ yard Diesel Dragline. 85' Boom. Good operating condition. Located Iowa. Complete overhaul recently. Box 2451

MARION — MODEL 70-E — 3½ yard Electric Shovel. Railway truck mounted. Power Equipment, 3 Phase, 60 cycle, 2300 volt. Good condition. Located Ohio. Box 2457

BUCYRUS-MONIGHAN 4-W Diesel Dragline. 110' Boom. 4½-yd. Bucket. Reported good working condition. Some extra parts included. Located Georgia. Box 2473

BUCYRUS-ERIE 175-B 2 Motor AC Electric Dragline. Truck Mounted. 125' boom. 1 each 4-, 5-, and 6-yd. drag buckets. Chain drive from main motor to intermediate shaft. Extra rotors for main and swing motors and other spare parts. 3—75 KVA 60 cycle 2200/220/440 volt transformer mounted on machine. Power supply 3 phase 60 cycle 440 volt. Completely overhauled since received from factory. First class operating condition. Located Kansas . Box 2450

3-W MONIGHAN, handles 4-yard bucket. Electric power. Real bargain for quick sale. Price and description upon request. BRODERICK & GORDON, 3901 Medford St., Los Angeles, Calif.

BUCYRUS-MONIGHAN Model 3½-T—70' boom dragline. 2½-yard dragbucket. Fairbanks Morse Diesel engine. Located North Dakota. Box 2472

MARION No. 125 steam shovel, 2¾-yd., 55-ft. boom—36 ft. sticks. On cats. Light plant. Now operating three shifts per day in strip coal mine. Central Missouri. Box 2493

BUCYRUS-ERIE 52-B—Combination 2½-yd. shovel and dragline, Atlas diesel engine. Excellent rebuilt condition. Also separate 2½-yd. 52 B shovel attachment. Very good condition. Smith Booth Usher Co., 2001 Santa Fe Ave., Los Angeles, Calif.

MISCELLANEOUS EQUIPMENT

SHOVEL EQUIPMENT—For Bucyrus-Erie 10-B—applicable to machine No. 14761 and earlier models. Practically new. Bargain price. Located Kentucky. Box 2487

SHOVEL EQUIPMENT—For Bucyrus-Erie 52-B Diesel. Handled only about 4,000 yards material. Equipment located Alabama. Box 2458

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FRONT-END EQUIPMENT of 50-B W. L. Electric Horizontal Crowd. 2 cu. yd. Coal-Loader. In good mechanical condition. Located Kansas. Box 2452

BUCYRUS-ERIE Scraper M-81—Single Cable Control. Capacity 7.2 cu. yd. Struck measure. 4-wheel 6 tires. Field reconditioned. For operation by 60 to 70 h.p. tractor. Located Oklahoma. Box 2418

BUCYRUS-ERIE Scraper M-81—4 Wheel 6 tires. Single Cable Control. Capacity 7.2 cu. yd. Struck measure. For operation by 60 to 70 h.p. tractor. Factory rebuilt. Located Indiana. Box 2417

BUCYRUS-ERIE Scraper Model H-74—2 wheel—rear dump. Capacity 6.69 cu. yds. Struck measure. For operation with 60 to 70 h.p. tractor. Factory rebuilt—guaranteed. Located Southern Wisconsin. Box 2416

DRAG BUCKET

1½-YARD Type "Y" Bucyrus-Erie Drag Bucket. Good condition. Located Kansas. Box 2454

TRACKSON—CRAWLER WHEELS—Type 4C-W—15 ton. Only used for demonstration. Condition just like new. Attractive price. Located Milwaukee. Box 2387

USED BUCYRUS-ERIE MODEL M-51 Scraper. Single cable control. 4-wheel. 6 tires. Capacity 4.5-cu. yd. For operation by 40 to 50 hp. tractor. Factory reconditioned. Located Indiana. Box 2442

USED BUCYRUS-ERIE MODEL M-51 Scraper. Single cable control. 4-wheel. 6 tires. Capacity 4.5-cu. yd. For operation by 40 to 50 hp. tractor. Factory reconditioned. Located Indiana. Box 2443

BUCYRUS-ERIE Crane Boom, heavy duty, for 43-B or 48-B. Length 55' and 70'.
BUCYRUS-ERIE shovel front for 43-B Special 22' boom. 17' dipper sticks. 2-yard AMSCO dipper.
KOEHRING shovel front for Model 501. Standard boom, dipper stick, 1¼-yd. dipper.
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⅝-YD. SHOVEL EQUIPMENT suitable for BUCYRUS-ERIE 19-B machine. Practically new. Located Indiana. Box 2465

BUCYRUS-ERIE M-81 Scraper. 4-wheel 6 tires. Single cable control. Capacity 7.2 cu. yd. struck measure. For operation by 60 to 70 h.p. tractor. Factory rebuilt. Located Indiana. Box 2469

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2—KOEHRING PAVERS; 1—Allis-Chalmers Gates gyratory rock crusher; air compressors, pumps, hoists, steel trusses, pipe, motors, etc. We have a large stock of surplus equipment. Bargain prices. Information on request. Karl Nussbaum, Louisville, Ky.

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2—Sanderson Cyclone well drills complete
3—3-way 7-yd. LaPlant-Choate dump wagons
3—Linn tractors
1—Allis-Chalmers Angledozer
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DRAG SHOVEL EQUIPMENT—For Bucyrus-Erie 1020 shovel. Located Rhode Island. Box 2332

USED INDUSTRIAL TYPE G 50' boom. 8-wheel Self-propelling 25-ton steam locomotive crane **M.C.B. couplers. Air line front to rear. 1½** yd. Industrial clamshell bucket. Boiler inspected October 1939. Good operating condition. Can be seen in operation. Located southern Illinois Box 2440

SLIGHTLY USED MODEL Q-7 3 cu. yd. Nelson Crawler mounted, bucket loader, complete with Model 20 International Modified Industrial tractor power unit, complete with swivel spout. Located Baltimore, Maryland. Box 2441

BUCYRUS-ERIE Scraper Model M-51—Single Cable Control. 4 wheel, 6 tires. **Capacity** 4.5 cu. yd. For operation by 40 to 50 h.p. tractor. Factory reconditioned. Located Indiana. Box 2415

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2—275 Koehring Mixers with Electric motors.
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6—20-yd. K. & J. Lift Door Air Dump cars
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7—70-ton 20x36 Baldwin Switchers.
3—Jordan spreaders excellent condition.
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1 6½-yd. shovel, Bucyrus 320-B Electric.
16 20-yd. Air Dump Cars, Magor, S.G.
4 20-yd. Air Dump Cars, Koppel, S.G.
36 5-yd. H. Dump Cars, Western, 36" Ga.
1 55-ton Gas Electric Locomotive
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